FOOD AND
NUTRITION
TECHNICAL
ASSISTANCE

Proceedings of the Standardized Monitoring and Assessment of Relief and Transitions (SMART) Workshop, July 23-26, 2002

October 2002

Food and Nutrition Technical Assistance Project (FANTA)
Academy for Educational Development 1825 Connecticut Ave., NW Washington, DC 20009-5721
Tel: 202-884-8000 Fax: 202-884-8432 E-mail: fanta@aed.org Website: www.fantaproject.org

This publication was made possible through the support provided to the Food and Nutrition Technical Assistance (FANTA) Project by the Office of Food for Peace of the Bureau of Democracy, Conflict and Humanitarian Assistance and the Office of Health, Infectious Disease and Nutrition of the Bureau for Global Health at the U.S. Agency for International Development, under terms of Cooperative Agreement No. HRN-A-00-98-00046-00 awarded to the Academy for Educational Development (AED). The opinions expressed herein are those of the author(s) and do not necessarily reflect the views of the U.S. Agency for International Development.

Recommended citation:

Food and Nutrition Technical Assistance (FANTA) Project. Proceedings of the Standardized Monitoring and Assessment of Relief and Transitions (SMART) Workshop, July 23-26, 2002. Washington, D.C.: Food and Nutrition Technical Assistance Project, Academy for Educational Development, 2002.

Copies of the publication can be obtained from:

Food and Nutrition Technical Assistance Project
Academy for Educational Development
1825 Connecticut Avenue, NW
Washington, D.C. 20009-5721
Tel: 202-884-8000
Fax: 202-884-8432
Email: fanta@aed.org

Acknowledgements

The SMART Workshop was sponsored by the American Red Cross (ARC), Canadian International Development Agency (CIDA), the Office of Food for Peace of the United States Agency for International Development (USAID/DCHA/FFP) and the Bureau of Population, Refugees and Migration of the United States Department of State (DOS/PRM).

The technical sessions were supported and coordinated by the Food and Nutrition Technical Assistance (FANTA) Project/Academy for Educational Development (AED) with assistance from Food Aid Management (FAM).

Technical support was provided by: Centers for Disease Control and Prevention (CDC); Center for Research on the Epidemiology of Diseases (CRED), University of Louvain School of Public Health; Linking Complex Emergency Response and Transition Initiative (CERTI), Tulane University, School of Public Health and Tropical Medicine; Refugee and Nutrition Information System (RNIS), UN Standing Committee on Nutrition (SCN); United Nations Children's Fund (UNICEF); World Food Program (WFP) and World Health Organization (WHO).

Special thanks to Anne Ralte, Eunyong Chung, Trisch Shmirler, Mara Russel, Bruce Cogill and Caroline Tanner for pulling the SMART workshop together and to the members of the TAG: Michael Golden, Brad Woodruff, Yvonne Grellety, Fitzum Assefa and Marie Connoly for their valuable technical insights. Helen Steifel, Annette Sheckler, Heather Finegan and Bruce Cogill assisted in the preparation of the proceedings.

TABLE OF CONTENTS

SMART WORKSHOP SUMMARY

ANNEXES

SMART WORKSHOP SUMMARY

The SMART Initiative

Standardized Monitoring and Assessment of Relief and Transitions (SMART) is an inter-agency global initiative to improve the assessment, monitoring, reporting and evaluation of humanitarian assistance interventions. The initiative will pilot an approach to routinely collect, analyze and disseminate nutrition and mortality data. Mortality and nutritional indicators are used to assess the severity of a crisis, identify needs, and prioritize resources. They are also used to monitor the extent to which the relief system is meeting the needs of affected populations and to gauge the overall impact and performance of humanitarian assistance in a given situation. These indicators are not used to measure the performance of any single organization or intervention. The SMART initiative emphasizes the importance of interpreting data in context to provide a comprehensive picture of a given situation to facilitate effective decision-making. In addition to the basic nutrition and mortality indicators commonly used in the acute phase of an emergency, other important indicators will be incrementally reviewed and added as part of the collaborative effort.

The SMART initiative aims to provide implementing partners and the broader humanitarian community with a range of tools to support humanitarian program assessment, monitoring and evaluation. The program will develop information management tools for field reporting, a web-based forum for posting survey reports, and a listserve for field practitioners to have direct, immediate access to the pool of experts drawn from various organizations.

SMART Workshop

The SMART (Standardized Monitoring and Assessment of Relief and Transitions) Workshop was held at the American Red Cross in Washington DC from July 23-26. The need for standardization in assessment, monitoring and reporting often has been highlighted over the past decade.[1] However this session was the first time that U.S., Canadian, and European private voluntary organizations (PVOs) and non-governmental organizations (NGOs), international organizations, academia and donors met to review and resolve problems of using assessment tools and methodologies in emergency situations. Participants included representatives from 45 institutions, including twenty non-governmental organizations (NGOs), seven UN agencies and other donors, universities, and government institutions. A list of participants can be found in Annex 8.

The technical sessions were convened by USAID's Bureau for Policy and Program Coordination. The papers presented at the technical session are available for download from the FANTA website www.fantaproject.org. Papers and presentations are also available for viewing at the Tulane University website, www.smartindicators.org. [2]

---

[1] CDC called for standardization 10 years ago following a review of the surveys in Somalia 1991-1992.

[2] Both websites will be linked with other websites currently used for technical discussion and coordination such as NutritionNet and ReliefWeb and coordinated with the United Nations Office for the Coordination of Humanitarian Affairs (UN-OCHA).

SMART Technical Working Session

The objective of the three-day technical working session was to establish a process for developing a generic, standardized methodology for assessing the mortality and wasting prevalence of populations in crisis that would be accepted and adopted by all organizations working in humanitarian assistance. This was followed by a one-day session for policy-makers to convey the key conclusions of the technical session and to promote a better understanding on how policy and program decisions are made by donors and international agencies.

The task of the participants was to reach consensus on a common methodology that is:

- simple and practical for field practitioners;
- endorsed for its technical soundness and validity by leading emergency nutrition experts, public health specialists, epidemiologists, and demographers; and
- shared to facilitate policy and program decisions.

The content of the technical session was organized by the Technical Advisory Group (TAG).[3] Presentations from experts highlighted critical problem areas related to the collection and analysis of nutrition and mortality data that may not yet be reflected in current guidelines and manuals. Participants further helped to identify and discuss critical problem areas related to the collection and analysis of nutrition and mortality data. One presentation was made on a survey model used in Afghanistan ("the Badghis model") as an example of a basic model that could be adapted and replicated.[4] Other presentations challenged traditional definitions of vulnerability and current intervention strategies that targeted selected groups from within the same geographical zone. It was suggested that who becomes malnourished is correlated more directly to geographically vulnerable areas than other vulnerability indicators. There was agreement that more efficient and cost effective methods of assessing nutritional status be used in the future. For example, anthropometric measurements and their deviation from a reference mean gives a more rapid, efficient and precise estimate of the extent of malnutrition than counting affected individuals.[5] Further presentations noted the importance of looking at trends over time in order to determine appropriate interventions.

Several presentations emphasized the need for interpreting data in context and the need to draw on a wide variety of information sources, particularly valuable local knowledge, to form an accurate picture of the crisis. Presentations on household food security models, such as those used by CARE and Save the Children UK, demonstrated the importance of collecting

---

[3] The TAG is chaired by FANTA Consultant Professor Michael Golden with representatives from CDC, WHO, and the NGO community.

[4] Woodruff, B. et al. Nutrition and Health Survey Badghis Province, Afghanistan, UNICEF and CDC, March 2002. See Annex 5.

[5] Golden, M. and Y. Grellety. (2002) Population nutritional status during famine. A view of 228 surveys from Concern MSF and ACF in 36 countries (draft). See Annex 6.

information to predict how a given event such as crop failure is likely to affect peoples ability to get food. It estimates who will be affected, how severely, when and for how long.

A presentation on the lessons learned from pilot testing in Sudan demonstrated that mortality data can be collected in the context of a long-term emergency response and transitional program. The use of mortality rates, in conjunction with nutrition and other key indicators, improved program planning and implementation.

A review by the Centers for Disease Control and Prevention (CDC) of nutrition and mortality surveys conducted in Somalia and Ethiopia over the last decade showed that the majority of surveys had methodological problems and established best practices had not been followed. This demonstrates a major problem with training and donor coordination, the lack of appropriate analytical tools and standardized reporting requirements, and problems in disseminating current best-practice methodologies.

The workshop was successful in meeting its stated objective to agree on a standardized survey methodology. It was also successful in establishing a broad-based consensus on the use of mortality and wasting rates, and the importance of ensuring data is timely and reliable for policy and program decision making.

Key Areas of Consensus

Following the presentations, the participants discussed key areas where there was agreement. These are noted below:

- Timely, reliable, and standardized data are essential for prioritizing humanitarian assistance for policy and program decisions. The humanitarian community needs to act quickly when a crisis erupts to ensure that accurate data are available for making appropriate program and policy decisions.
- Implementing partners and donors need to demonstrate that significant investments in humanitarian response to complex emergencies are effective through the use of technically sound, valid measures.
- Crude Mortality Rate (CMR) and wasting rate of children under five, are considered the most basic, essential indicators for assessing the overall severity of population stress and for monitoring the overall effort of the humanitarian community. The indicator, Crude Mortality Rate (CMR), should not be changed until research findings validate that Under-5 Mortality Rate is a better alternative. Wasting is measured using weight-for-height.[6]
- A general consensus was reached on developing a generic, standardized methodology to be used in all emergencies for assessing nutritional status. Current best-practice survey methods should not be changed until new ones have been tested and validated.

[6] [7] The general (WHO) classification on wasting prevalence using WHO/NCHS reference standards: < 5% of population = acceptable; 5-9 % = poor; 10-14% = serious; >15% = critical. Crude Mortality Rate is expressed in units of deaths/10,000/day in emergencies. CMR greater than 1/10,000/day indicates a very serious situation.

- Analysis of trends is recommended for determining whether a situation warrants intervention. Absolute thresholds should not be used in isolation to trigger intervention.[7] Nutritional status that steadily continues to deteriorate, even if below standard cut-off prevalence rates merits attention and appropriate interventions. Frequent surveys using simple methodology, are recommended to recalibrate surveillance data and monitor trends.

- Mortality data collection is more difficult to collect. It is prone to significant error and subject to manipulation. Mortality survey data needs to be analyzed with other data such as nutritional status, surveillance (incidence, program coverage), grave counting, religious authority records, mother to child ratio, and demographic profile.

- Mortality data, in isolation, cannot be used to decide how and which programs should be implemented. Since prevalence surveys provide only a snapshot in time, surveillance (incidence) data are useful to give current and ongoing information on the evolution of the crisis and the nature of the problems encountered. Where there is no system in place for gathering and collating surveillance data, survey data has to be collected to guide programs.

- Edema in the severely malnourished develops over a very short period of time, and therefore, is often missed by surveys. It also occurs in "pockets" without relationship to wasting prevalence. Edema (functional nutrient deficiency) is due to a poor quality diet. Wasting (growth-nutrient deficiency) is usually due to both a lack of food and an unsuitable mixture of food types (lack of dietary diversity). Data on wasting and edema should be reported separately.

- Nutritional survey data cannot be interpreted in isolation. A wide variety of information sources should be drawn on. The food security context needs to be understood to interpret nutritional survey data. Although there is not yet an agreed method or best practice, a household food security appoach has been effectively used to predict quantitatively how an event, such as crop failure or price change, is likely to affect people's ability to get food. It gives an approximation of who will be affected, how severely they will be affected, and when they will be affected.

Conclusions on Specific Technical Areas

Crude Mortality Rate (CMR)

Crude Mortality Rate (CMR) is the most significant public health indicator for all populations, particularly for societies in crisis. For populations in crisis, it is vital that humanitarian organizations have some idea of this measure in all populations.

CMR is useful for:

- Assessing the overall severity of population under stress.
- Informing and prioritizing resource allocation and advocating the urgency for intervention.
- Documenting the crisis and assessing the overall effort of the humanitarian community using trend analysis, rather than fixed thresholds. Typically, several organizations provide the package of interventions essential to meet critical needs in emergencies. With the inter-

dependency of the humanitarian community, this measure is not appropriate for evaluating individual interventions or performance of individual implementing partners.
- Calibrating surveillance data and analyzing information.

CMR Methodology:

- Should be collected by surveillance methods wherever possible. A survey should be used to analyze data and where there is no reliable surveillance data.
- When a survey is necessary, this should be combined with anthropometric surveys for efficiency. This should be undertaken when the most stressed and poorest populations are likely to suffer from food shortages.
- When there is insufficient evidence for recommending a particular method, organizations should use the current household recall method. Other methods should be chosen when they are thought to have advantages. Prior birth history method may be a promising method and needs further review.
- A three-month recall period is recommended (the most common methodology is a retrospective recalling of deaths in the household within a period of time). However, this can be changed where there is a clear advantage in using a different recall period.
- The scale of surveys is usually determined by each agency's needs, but consideration should be made of the needs of the beneficiary and the broader humanitarian community. Coordinated multi-agency surveys are recommended in the future and data coordination is essential at country level. A survey too large in scale averages out vulnerable pockets, one that is too small a scale misses pockets of vulnerability. The recommendation is to connect areas based on characteristics likely to be important determinants of nutritional status, for example, staple food areas, urban/rural areas, tribal/ethnic areas, internally displaced person (IDP) and refugee/resident areas.

<u>Nutritional Status of Children Under Five</u>

A high prevalence of malnutrition in children under five in this group indicates that the whole population is in need of assistance and not just the age group that has been surveyed. However, in some situations, other groups such as women or the elderly may be more vulnerable and should then be included in the survey. Wasting rate, as measured by weight-for-height using standardized Z-scores (standard deviations from the reference median), should be used for overall reporting on the severity of the crisis. Mid-upper arm circumference (MUAC) is useful for rapid screening of individuals referred for further assessment, but population based prevalence surveys should always use weight-for-height. Rapid assessments often use MUAC and this is appropriate.

Anthropometric Surveys are useful when:

- Assessing the overall severity of nutritional stress in a population.
- Informing of the urgency for intervention and prioritizing resource allocation.
- Advocating for and documenting of the overall effort of the humanitarian community using trend analysis.
- Designing feeding programs.
- Surveillance/program data show there is a problem.
- Program "coverage" is likely to have changed.

Anthropometric Methodology:

- Simple or systematic random samples should be used where feasible; in most chaotic emergency situations, cluster sampling should be used.
- The clusters should be selected randomly with a chance of selection proportional to the population size of the natural groups under consideration, for example, villages.
- 30 x 30 cluster methodology is recommended unless there is expertise available to make assumptions necessary to calculate a different sample size. The total sample size should be split among at least 30 clusters.
- Include all children aged 6 months to five years in the household in the sample. Houses with no children MUST be included for CMR/demographic and other data collection, even if they cannot provide any subjects for anthropometric measurements.
- Interpret nutritional status data in the context of food security and agro-economic data. Food security data will help to decide where and what programs should be established.
- Secure areas are most likely to be used for surveys. Reports should indicate that nutritional status is likely to be worse in insecure areas that are not accessible.

Additional Data to be Collected with Surveys:

- The recommendation is to start with the minimum set of essential data such as case management of measles, malaria, and diarrhea. Data on micronutrient deficiencies are optional, depending on the capacity and the likelihood of an existing problem. Food security information is essential for data analysis and interpretation, but can be collected separately via focus groups, or other methods.
- Any other additional data should be justified for relevance and usefulness. A checklist of options includes morbidity, water and sanitation, infant feeding, access to health services, and child protection.

<u>Other Conclusions</u>

Data Collection:

- Every survey should have clearly stated objectives. This will help to determine methods, sample size and cost.
- Integrate contextual data analysis to interpret and understand the causes of malnutrition. A household food security approach has been successfully used in several emergencies to predict decline in nutritional status. It has been used early in a crisis to begin appropriate interventions that prevent malnutrition.

Analysis and Interpretation:

- An advisory analytical service is needed to help implementing partners analyze data. Each survey should be reviewed and validated by an independent, inter-agency advisory group to ensure there is technical soundness in the methodology, analysis and interpretation. There is a need to create an environment of support so there is confidence in the findings.
- New Microsoft Windows-based, user-friendly software is needed for anthropometric surveys that facilitates analysis.

Reporting:

- A standardized reporting format should always be used, which includes all the information needed to evaluate the quality of the survey and demonstrate that the appropriate methodology has been used. This will ensure that all surveys provide key essential information applicable to each emergency.
- Reports should use the terms "wasting", "stunting" and "edamatous malnutrition". Reports should present data on wasting and edema separately, as well as aggregated as Global Acute Malnutrition (GAM) and total severe, acute malnutrition (SAM) rates.
- Wasting, as measured by weight-for-height, is useful for admission for therapeutic and supplementary feeding as this has a higher correlation with mortality risk at individual level.
- The report and raw data should be left in the country with the statistical office or another appropriate office so that there are historical data and the potential to analyze trends over time.
- A central repository, such as the UN's Refugee Nutrition Information System (RNIS), should also archive the raw data and reports. These data should be accessible only to those who use it to improve the provision of humanitarian assistance.
- Donors should be encouraged to include in their contracts and grant agreements that donor-funded survey results and raw data should be in the public domain.

Operational Research:

Current survey methods should not be changed until new methods have been tested and validated. Further research is needed on the following:

- The Under-5 Mortality Rate as a proxy indicator for Crude Mortality Rate (CMR).
- The use of prior birth history method to determine Under-5 Mortality Rate.
- Test the methodology of calculating from the mean to give a more rapid, efficient and precise estimate of the extent of malnutrition than counting individuals.
- Evaluate the utility of using samples to map the geo-spatial distribution of the prevalence of malnutrition and to examine whether these data correlate with other measures of vulnerability such as those used in a household food security model.
- Evaluate and progressively adapt the Afghanistan (Badghis) survey method as a general model.
- The household food security methodology needs to be fully developed, tested and validated. The current method requires three weeks of intensive training followed by supervised field experience before the methodology can be used accurately. This is usually too cumbersome for general use.

V. Next Steps

- An inter-agency technical support system to build capacity at all levels (including donors, implementing partners, local partners) will be needed to ensure the standardized methodology and other recommendations are implemented. This includes the development of guidelines and other tools accessible to all organizations. As requested by workshop participants, it will also include an independent technical advisory group to review and accredit surveys to ensure validity for policy and program decision making. Donors were requested to coordinate so that all donor-funded programs are required to use the same generic, standardized survey methodology and reporting format, and that the data are archived in the public domain.

- As a joint effort, organizations will apply the standardized methodology and other recommendations in pilot countries, with an immediate request from U.S. PVOs and the World Food Program (WFP) to apply them to the Southern African drought situation. Operational research and validated studies will help guide future recommendations and modifications on the current standardized methodology and the potential use of alternative indicators to monitor the impact of the overall performance of relief assistance. The environment of mutual support demonstrated at the workshop will continue and technical assistance provided to ensure standards are met by all participating organizations. Specific next steps are outlined below:

<u>Technical Support</u>

Reliable data are needed for making policy, funding and program decisions. To date, funding to strengthen capacity to collect health and nutrition data in emergencies has been limited or non-existent. Relief organizations are interested in improving their capacity and those of local partners. For this to succeed, a coordinated technical assistance support system is needed with all organizations having access to technical expertise, manuals, and other tools.

- Develop a simple, easy-to-use SMART manual of methodology on Crude Mortality Rate (CMR) and nutritional status, including guidance on how to interpret data using food security analysis.
- Undertake training at all levels - PVO/NGO headquarters, local capacity, donors, etc. This should use multi-media training tools distributed through a website and CD-ROM. The training should include CMR/nutrition surveys and food security data collection and analysis.
- Develop a global technical support system, and expand the inventory of organizations and individuals with expertise who can provide assistance. This should include:

    - An independent, analytical advisory service or Technical Advisory Group (TAG) to provide assistance in analysis of data.
    - The Technical Advisory Group (TAG) should review, provide feedback and then officially give their assessment on the technical validity of surveys.
    - A listserve with rapid responses to questions on methodology from field practitioners.

<u>Information Management</u>

A SMART website could provide a central workspace for sharing and disseminating information to the humanitarian community. The website will be linked to the NutritionNet website and other relevant sites. It will serve as a forum for discussion groups on various issues that relate to the health and nutrition status of populations in crisis.

- Continue to expand and refine a SMART website.
- Develop the listserve capability with the Technical Advisory Group and other experts willing to provide technical advice.
- Develop specific user-friendly Windows-based software for analysis of nutrition and CMR surveys and presenting all data that should be reported in the standardized format. The format should also allow for the examination of the raw data's internal structure to assess the quality of the data.

- Disseminate multi-media training tools.
- Develop a standard reporting format for all surveys.

Country Pilot Studies

The purpose of the country studies is to apply the SMART methodology as well as accompanying recommendations and best practices highlighted during the workshop. It will demonstrate to what extent the inter-agency, collaborative approach to planning, designing and implementing surveys and interventions is realistic. Depending on each country, the pilot study will provide an opportunity to integrate operational research issues that need to be tested and validated. The pilot studies will help to build local capacity, which in most cases will be through the Ministry of Health and UNICEF.

- Angola: Angola is prepared to be the first pilot site. There is consensus among donors and other partners. A plan of action and resource needs are being prepared by UNICEF with the Ministry of Health, to be reviewed by participating organizations.
- Southern African Drought: Further discussion is needed with the U.S. PVO consortium (CARE, World Vision, CRS) and WFP, and other relevant organizations. The consortium is interested in application of the SMART methodology and other recommendations. A joint proposal for six countries is being prepared for submission to USAID.
- Other countries: Further discussions are needed to decide how best to move forward in the Democratic Republic of Congo (DRC) and Afghanistan.

Operational Research

- Alternative methodologies presented at the workshop require further testing and validation. Issues that merit further research include: use of prior birth history to determine Under-5 Mortality Rate; use of Under-5 Mortality Rate as an alternative indicator of the severity of the situation (replacing Crude Morality Rate); evaluating and progressively adapting the Afghanistan (Badghis) survey method as a general model; developing a simplified household food security model; and testing the simplified method of calculating prevalence of wasting using weight-for-height and deviation from a reference mean. The selection of indicators, methodologies and program interventions promoted by the SMART initiative will be guided by research findings that are practical for field application. Operational research and detailed audit of programs is crucial for the humanitarian community to continually evolve and refine best practices.

- Develop an operational research agenda with participating organizations, focusing those areas highlighted at the workshop. To the extent possible, integrate these studies in the context of the country pilot studies.

Donor and Other Coordination

To put recommendations into practice, an investment by ALL organizations is needed. Each organization should incorporate recommended best practices into its policy and operational guidelines, proposal requests, training activities, and reporting. Furthermore, donor coordination is essential.

- Donors who sponsored the workshop will develop a plan of action for advocacy and outreach to other donors.

- Coordinate on funding requirements for building capacity and institutionalizing a global technical assistance support system. Donor investment is also needed for operational research to test and validate alternative methodologies and the theoretical basis for modifying current recommended methodologies or indicators.
- Develop standardized grant requirements that include recommendations from the workshop. Data collection funded by donors should be public domain for the humanitarian community, using standardized methods for collecting and analysis on mortality and nutritional status, and interpreting data in the context of food security.
- Develop common reporting on humanitarian assistance that are jointly funded and the use of a common database for monitoring the overall effort of the humanitarian community.

ANNEX 1.

Agendas

Technical Working Session: July 23 - 25, 2002
"Standardizing Survey Methodology"

Standardized Monitoring and Assessment of Relief & Transition (SMART)
American Red Cross Conference Hall (2nd floor of ARC Museum)
Red Cross Square, 1730 E Street (cross street: 18th), NW, Washington D.C.

TUESDAY, July 23

8:00 *Registration & Breakfast*

9:00 Welcome
Gerald Jones, Sr. Vice President, International Services, American Red Cross

Introduction
- Dick Wall, Workshop Moderator/ Consultant, Food and Nutrition Technical Assistance (FANTA) Project /AED
- Paula Lynch, Deputy Director, Policy and Resources, State/PRM
- Anne Ralte, Humanitarian Assistance Advisor, Bureau for Policy and Program Coordination, USAID

9:15 Overview: Complex Emergencies - What and Why Do We Measure?
Dr. Frederick Burkle, Jr., Deputy Assistant Administrator, Bureau for Global Health, USAID

9:45 Overview: Nutritional Surveys in Emergencies
Dr. Michael Golden, Chair, Technical Advisory Group, SMART (Consultant, FANTA/AED)

10:15 Overview: Interpreting Data in Context of Food Security
Dr. John Seaman, SCF/UK

10:45 *Coffee break*

11:00 Overview: Surveillance & Monitoring in Complex Emergencies
Dr. Maire Connolly, Program Leader, Communicable Diseases in Complex Emergencies Programme, WHO

11:30 Discussion: Dick Wall

12:30	*Lunch*
1:15	Review of Surveys and Future Implications Dr. Michael Golden
1:45	Review of Survey Methodology Dr. Bradley Woodruff, Medical Epidemiologist, CDC
3:30	*Coffee break*
3:45	Panel Discussion: Critique of Current Methodology (and How to Resolve Problems) (includes discussion on pros/cons of mortality/nutrition indicators) Facilitator: Dr. Bradley Woodruff, CDC Panel: Anne-Sophie Fournier (ACF), Dr. Mark Myatt, Dr. Alessandro Colombo (WHO), Dr. Paul Spiegel (CDC/UNHCR)
5:30	End of session Optional Sessions: Survey Methodology, Food Security, Information Mgt.

Technical Working Session: July 23 - 25, 2002
"Standardizing Survey Methodology"

Standardized Monitoring and Assessment of Relief & Transition (SMART)
American Red Cross Conference Hall (2nd floor of ARC Museum)
Red Cross Square, 1730 E Street (cross street: 18th), NW, Washington D.C.

WEDNESDAY, July 24

8:15 *Breakfast*

8:45 Summary of Day 1: Caroline Tanner, Emergency Advisor, FANTA/AED
Introduction: Dick Wall

9:00 Methodology Case Study: Democratic Republic of Congo
Dr. Les Roberts, Director of Health Policy, International Rescue Committee Q&A. Technical facilitator: Dr. Mark Myatt, Consultant, Epidemiologist & Senior Fellow, Institute of Ophthalmology

9:40 Methodology Case Study: Ethiopia
Dr. Paul Spiegel, Medical Epidemiologist, CDC/UNHCR
Q & A. Technical facilitator: Courtland Robinson, Research Associate, Johns Hopkins Bloomberg School of Public Health

10:20 *Coffee break*

10:30 Methodology Case Study: Afghanistan
Dr. Bradley Woodruff, Medical Epidemiologist, CDC
Q & A. Technical facilitator: Fitsum Assefa, Project Officer, Micronutrients, UNICEF

11:10 PVO Perspective: Lessons Learned on Methodology from Sudan
Bernard Vicary, Monitoring and Evaluation Officer, World Vision
Q & A. Technical facilitator: Anne-Sophie Fournier, Technical Director, ACF

11:50 *Working Lunch*

12:35 Break Out Group Discussions on Survey Methodology

Nutritional status in:

- Adults and elderly population (Dr. Dolline Busolo, HelpAge International)

- Under 5, including infants (Dr. Yvonne Grellety/TAG, Consultant, FANTA/AED)
- Pregnant & Lactating Women (Dr. Mary Lung'aho, Linkages/AED, Dr. Barbara McDonald, CIDA
  What are problems, issues, priority areas? What recommendations can/cannot be supported by surveys? What needs follow up?
- Other information (besides health/nutrition) to be collected (Anna Taylor, SCF/UK)

2:00 Plenary: Break Out Group report back and discussion

3: 45 *Coffee break*

4:00 Panel Discussion: Standardized Methodology & Other Information to be collected
Facilitator: Dr. Michael Golden

- Critical issues
- Review of input/comments on Afghanistan model
- Discussion

Panel (TAG) members: B. Woodruff, M. Connolly, C. Prudhon, Y. Grellety, F. Assefa

5:30 End of session

Technical Working Session: July 23 - 25, 2002
"Standardizing Survey Methodology"

Standardized Monitoring and Assessment of Relief & Transition (SMART)
American Red Cross Conference Hall (2nd floor of ARC Museum)
Red Cross Square, 1730 E Street (cross street: 18th), NW, Washington D.C.

THURSDAY, July 25

8:00	*Breakfast*
8:15	Summary of Day 2: Fitsum Assefa Introduction: Dick Wall
8:30	Standardized Methodology: Discussion, Recommendations Facilitator: Dr. Michael Golden
9:30	Food Security: Overview on Methodology and Best Practices Dr. John Seaman, SCF/UK
10:30	*Coffee break*
10:45	Overcoming the Challenges of Interpreting Nutritional Status Data: Examples from Field Experience. Anna Taylor, Nutrition Advisor, SCF/UK
11:45	Food Security: Experience and Lessons Learned from the Field Rita Bhatia, Senior Program Advisor, Strategy and Policy Division, WFP
12:05	Panel Discussion: Best Practices in using Food Security Indicators to interpret Health/Nutrition Data Facilitator: Dr. Bruce Cogill, Director, FANTA/AED Panel: Mugo Muita (CARE), Anna Taylor/John Seaman(SCF/UK), Rita Bhatia (WFP) Dr. Nancy Mock (CERTI/Tulane University)
12:35	*Lunch*
1:20	Panel Discussion: Information Management Facilitator: Dr. Nancy Mock, Director, CERTI Project, Tulane University, School of Public Health & Tropical Medicine Panel: Jeff Henigson (UNICEF), Rhonda Davis (OFDA), Dennis King (HIU)
2:20	Introduction/Objectives of Country Pilot Studies: Anne Ralte

2:30	Break Out Group Discussions: Country Pilot Studies (Preliminary planning session by groups operational in countries. To be followed up after the workshop by country team/working group) • Angola Facilitator: Dr. Paulina Semedo (MOH), MarjattaTolvanen (UNICEF) • Democratic Republic of Congo Facilitator: Dr. Les Roberts (IRC), Anne-Sophie Fournier (ACF) • Afghanistan Facilitator: Dr. Bradley Woodruff (CDC), Rita Bhatia (WFP), Fitsum Assefa (UNICEF) Technical Facilitators (floaters): Dr. Michael Golden, Dr. Yvonne Grellety
3:30	*Coffee break*
3:45	Plenary: Break Out Group reports, open discussion
4:30	Wrap Up - Review consensus, issues for follow up, next steps: Dick Wall
5:30	**End of Technical Working Session**

Policy Session, July 26, 2002: "Promoting Policy and Program Priorities Based on Data"

Standardized Monitoring and Assessment of Relief & Transitions (SMART)
American Red Cross Conference Hall (2nd floor of ARC Museum)
Red Cross Square, 1730 E Street (cross street: 18th), NW, Washington D.C.

FRIDAY, July 26

8:30 *Breakfast*

9:00 Introduction & Summary of Technical Working Session, July 23 - 25
Dr. Debarati Guha-Sapir, Director, Centre for Research on the Epidemiology of Diseases (CRED), University of Louvain School of Public Health

9:20 Complex Emergencies: Measuring Effectiveness Across A Multitude of Indicators
Dr. Frederick Burkle, Jr. Deputy Assistant Administrator, Bureau for Global Health, USAID

9:40 Critique: Data and Famine in the Horn of Africa over the Last Decade
Dr. Paul Spiegel, Medical Epidemiologist, CDC

10:00 Overview: Nutrition Policy Issues in Complex Emergencies
Dr. Michael Golden, Chair, Technical Advisory Group, SMART

10:20 Overview: Surveillance, Monitoring and Health Policy Issues in Complex Emergencies
Dr. Maire Connolly, Program Leader, Communicable Diseases in Complex Emergencies Program, WHO

10:40 *Break*

11:00 Overview: USG Response to Complex Humanitarian Crises and Lessons Learned
Eric Schwartz, Senior Fellow, United States Institute of Peace

11:20 Panel Discussion: How do donors establish policy and funding priorities? What information is used, needed? What are data gaps and how to resolve them?
Chair: John Simon, Deputy Assistant Administrator, Bureau for Policy and Program Coordination, USAID
Panel:

- USAID: Juanita Rilling, Team Leader, OFDA Planning Team/ Jon Brause, Chief, Emergency Program Division, Office of Food for Peace

- State/PRM: Paula Lynch, Deputy Director, Policy and Resources
- CIDA: Barbara McDonald, Senior nutrition Advisor
- WFP: Dianne Spearman, Chief, Strategy and Policy Division
- UNHCR: Andrew Mayne, Chief, Population and Geographic Data Section, Operational Support

12:30 *Lunch*

1:30 Marketplace Exercise: Opportunity to Negotiate. What can NGOs, donors, and multinational organizations contribute to the implementation of the SMART survey methodology? What is needed to make this contribution, and from whom?
Facilitator: Mara Russell, Coordinator, Food Aid Management

2:30 Plenary: Break Out Group report back and discussion

3:00 Summary and Recommendations of Policy Session: Dr. Sapir-Guha

3:30 *Coffee*

4:00 Overall Workshop Summary & Recommendations: Dick Wall, Consultant, FANTA/AED

4:30 Close of Workshop: Anne Ralte, Humanitarian Assistance Advisor, USAID/PPC

ANNEX 2.

HelpAge International

Assessment of adults and older people in emergencies: Approaches, Issues and priorities
A presentation for a USAID SMART Workshop
Washington, DC, 23-26 July 2002
By Dolline Busolo

HelpAge International

HelpAge International is a global network of over 70 not-for-profit organisations with a mission to work with and for disadvantaged older people worldwide to achieve a lasting improvement in the quality of their lives.

HelpAge International would like to express their gratitude to the conference organisers for inviting us to participate in the conference on Standardised Monitoring and Assessment of Relief and Transition.

Participation in the conference would not have been possible without financial support from Food and Nutrition Technical Assistance (FANTA) supported the participation of Dolline Busolo the Regional Nutritionist as a resource person to the conference.

Introduction

Experience over the past few years has revealed clear difficulties in arriving at an agreed protocol for the measurement of malnutrition in adults and older people in emergencies. This has in turn produced widely differing criteria for inclusion in dry ration distribution and selective feeding programmes.

Although the use of MUAC and BMI have been used for assessments and intervention, to date there is no agreement about:

(a) which methodologies should be used to assess the nutritional status of older people in emergencies
(b) the sampling approach to arrive at the required representative sample size for older persons
(c) the cut-off points that should be used to categorise the nutritional status of adults and older people.

This lack of agreement is reflected in the exclusion of older people from international standards, such as Sphere, that guide best practice in emergencies.

Approaches to the measurement of adults and older people

At present, there are a number of approaches being discussed in international nutrition circles, with proponents of BMI, MUAC, the Cormic index and knee height to name a few. Each approach has its own strengths and weaknesses. However, the present lack of consensus is resulting in poor targeting, widely differing outcomes and, in many cases, the exclusion of the most vulnerable.

Despite the lack of standards, the difficulties with MUAC and BMI cut off points and the lack of agreement regarding sampling, there are several organisations that are involved in targeting adults and older people for assessment and intervention in emergencies. Some of the approaches used and results gained are outlined below.

Assessments and Interventions

a) Case Study – Ethiopia, 2000

The emergency in south eastern Ethiopia in 2000 highlighted the problems associated with a lack of consensus and a lack of an agreed protocol. Various approaches were used, and widely divergent survey outcomes recorded.

HelpAge International, in conjunction with the Al-Nejah Charity organisation, SOS-Sahel and Goal Ethiopia, undertook a supplementary feeding programme for children under five years of age, lactating, pregnant mothers and older people in Somali region 5[1]. The admission criteria for older people was MUAC <21cm combined with at least one of the following social/economic risk factors:

- ✓ those living alone
- ✓ those who had lost livestock
- ✓ those who had no food in the house
- ✓ those who were immobile
- ✓ those who had no relatives, no children and no caregivers.

The discharge criterion was a MUAC of 23cm or above and consistent weight gain for two consecutive sessions.

The admission cut off point cut off point of 21cm was arrived at by consensus among the organisations who were implementing the project and reflected the screening cut off for supplementary feeding programme for adults in emergencies (mainly lactating and pregnant women). In this case the team saw no need to have separate cut off points for adults and older people. The discharge cut off point of 23cm was similar to the WHO recommended sex specific cut off points for men for Chronic Energy Deficiency.

[1] Relief Project for Drought Affected Older People in Borena and Warder Zones, Ethiopia. Report by HelpAge International, Ethiopia, 2002.

Oxfam-GB targeted internally displaced people in Bolosso Sore in Oromia region for a supplementary feeding programme[2]. The admission criteria for older people was those aged over 50 years with a MUAC<18.5 cm.

Assessment using BMI showed that none of the admissions had a BMI <17.0 Kg/m^2. An assessment of the causes of malnutrition of the older people admitted showed that many of the beneficiaries were widows with no access to land. Poor food intake was exacerbated by physiological problems, especially poor sight and dentition difficulties as well as chronic illness. They had no source of income and depended on begging for their survival. Community support was notably poorer for older people separated from their families. Older people were clearly chronically vulnerable.

Concern International, implementing an emergency nutrition program in Damot-Weyde, Ethiopia, used MUAC, BMI and Cormic Index adjusted for adults of 18 years and above[2]. The prevalence of malnutrition was reported for observed BMI and adjusted BMI (Cormic Index) for adults of 18 to 49 years and those above 49 years. There were large differences between the prevalence rates reported for observed BMI and adjusted BMI. Using a BMI cut-off of <17 Kg/m^2, the prevalence of malnutrition among younger adults (18-49) was 1.7% (adjusted Cormic Index) and 10.7% (unadjusted). The prevalence among older people (over 49 years) was 2.0% and 24.5% for adjusted and unadjusted prevalence rates respectively. MUAC cut-off of 180mm identified a similar proportion of adults with global malnutrition to that using a BMI of <16 Kg/m^2. Mean BMI and mean MUAC significantly decreased with age.

During the same period, **GOAL** implemented a programme in Yabello Wareda, Oromiyia region, targeting under fives, adults and older people. In this case, the recorded levels of global malnutrition varied widely depending on the cut-off points used. Using a cut-off point of 18cms, global malnutrition was 3.4% for older people, whilst a cut-off point of 23cms gave 62.9%.

b) Case Study – Sudan 2000/01

The case of **Action Contre La Faim**[3] illustrates how adults and older people were selected and for inclusion in a therapeutic Feeding programme in Juba Sudan. BMI was used as the conventional selection indicator. The programme took place from October 2000 to February 2001, targeting 103 adults and older people with BMI <16 Kg/m^2 and those with oedema. The **nutritional treatment** of severe malnutrition in adults and elders was based on the same formula used to treat children (F75, F100 or HEM[4], porridge, family meal and fruits/vegetables), with added minerals and vitamins. However, the amount of milk given per kilograms body weight was much less for adults than children since adult daily energy needs were assumed to decrease with age. ***Systematic medical treatment*** included vitamin A, Folic Acid, Amoxycillin, Mebendazole, Ferrous sulphate and Chloroquine. ***Health Education*** was as given to the beneficiaries on a daily basis.

[2] Report of the workshop on Addressing the Nutritional Needs of older People in Emergencies: The Issues and challenges, Ghion Hotel Ethiopia (HAI November 2000)
[3] Case study of nutrition intervention for older people by Action Contra La Faim and HAI in Juba
[4] High Energy Milk formula is Dry Skimmed Milk + Oil + Sugar + Complex of minerals and vitamins.

The discharge criteria are shown below:

Adults	Older People
BMI equal or above 17.5 kg/m^2 for 8 days	BMI equal or above 16.5 kg/m^2 for 8 days
No oedema for 15 days	No oedema for 15 days
Ability to walk	Ability to walk

At the end of the programme the number of adults and elders who had defaulted were 5.4%. This was very satisfactory according to the ACF defaulting rate (<15%). The average weight gain for adults and elders was 6.6g/kg/day and the average length of stay for both adults and elders was 42.1 days. Treatment of severe malnutrition in adults and elders took longer than for children.

c) Case Study – Kenya, 2001

In October 2001, **HelpAge International** undertook a survey of older people in Turkana, a drought affected district of northern Kenya. The objectives of the survey were to examine the situation of older people with special focus on nutritional status and social economic status.

The survey was undertaken in collaboration with Oxfam GB who were assessing the nutritional status of children under five. The survey employed a two stage 30 by 30 cluster sampling method, which was modified to 30 by 15 given that the population of older people is about half that of children under five. Different households from those targeted for children were assessed. 457 older people were assessed.

Anthropometric measurements assessed entailed weight, height and MUAC. Oedema and dehydration were observed.

Focus group discussions and household survey methods were used to assess risk factors for older people. The nutrition vulnerability framework for older people[5] was used. This entailed discussion and assessment of factors such as:

- ✓ access to food
- ✓ functional ability (dependency)
- ✓ socio-economic status
- ✓ psychological/emotional assessment
- ✓ health
- ✓ care given to and given by older people to other family members
- ✓ intra household food distribution
- ✓ the food rations in terms of appropriateness and access

[5] Better Nutrition for older people : Assessment by Action by Suraiya a Ismail and Mary Manandar

Older people were also involved as key respondents to the wider issues of food security, coping mechanisms, assessment of the community resources and the identification of the longer term and short-term strategies based on the livelihoods of the community.

Household data was entered and analysed using EPI Info version 6.04 and SPSS version 10. The results were interpreted based on the WHO/CDC benchmarks for children that outline the prevalence levels and the corresponding recommended action.

The global acute malnutrition level for older people based on BMI <17 Kg/m^2 were 22.9% for older men and 20.5% for older women. The severe acute malnutrition (BMI less than 16 Kg/m^2) was 15.2% and 12.55% respectively. Based on MUAC, the prevalence of global acute malnutrition was 19.5% for older men and 17.7% for older women based on MUAC of less than 21 cm.

Other factors that were found to negatively affect the nutritional status of older people based on MUAC assessment were loss of caregiver and mental disability. There was a significant negative correlation ($p<0.05\%$) between MUAC and oedema, immobility, extreme weakness, dehydration and living alone. The most important social risk factors associated with malnutrition in this community were living alone and the loss of caregivers. Frequently reported diseases among older people were joint pains (53.8%), back pains (44.6%), poor eyesight (42.9%), and fever and malaria (37.6%).

Indicators from the child assessment showed that global acute malnutrition was 19.4% for girls and 17.6% for boys. Overall, the nutritional situation of older people and children under five were considered to be serious in Turkana. The crude mortality was 2.0 and the under five mortality was 3.1. Based on weight for height assessment for children, BMI and MUAC for older people, the nutritional status of both children and older people were both classified as poor.

Regression analysis was undertaken to establish the correlation between the different risk factors and the MUAC and BMI values for the population.

<u>d) Case Study – Sierra Leone 2002</u>

Current Evangelism Ministries, a local NGO in Sierra Leone, used basic community indicators to assess the vulnerability of internally displaced older people in war affected Kenema region. The indicators included visible malnutrition, (according to the assessment of community workers), low physical strength, trauma, poor health, lack of resources, lack of support in the care for war-orphans and young children, lack of carers, use of walking sticks/crutches (immobility), displaced/returnees rape victims that have no access to medical attention, isolated older persons staying in non-supporting families and lack of basic needs. With this approach, a target group of 200 was selected for emergency relief from a population of 1,300 older people.

Issues arising

From the above case studies, it is clear that several issues and problems have yet to be resolved.

- ✓ In most cases, anthropometric measurements have been used in combination with social/economic risk factors. This approach has the advantage of looking at nutrition within a wider perspective and helps generate understanding of the nutritional environment of the individual.

- ✓ From the case studies presented, there appears to be a relationship between certain MUAC cut off points and certain BMI cut off points. However, they do not always seem to be consistent. It may be that there is no correlation or that variances are as a result of differences in population groups or in the way the assessments have been carried out.

- ✓ Whatever the choice of nutrition indicator, the same indicator should be used to monitor change at both assessment and intervention stages. In cases where MUAC is used as a rapid assessment tool, BMI can be used to verify, and then either tool used to monitor and eventually assess purposes of discharging from feeding programmes.[6]

- ✓ There is lack of consistency in the sampling method and interpretation of results of surveys in the cases. Most of the assessments and interventions have been based on the practises for adults and children. Is there a need to have separate cut off for screening for admission into supplementary and therapeutic feeding programmes for older people and adults in emergencies?

- ✓ Community indicators provide a basic means of assessment that do not require technical staff to administer and which may be appropriate in acute emergencies, especially in the absence of trained nutritionists and with limited resources.

In almost all case studies, there has been extensive use of BMI and MUAC. However, there are unresolved issues about both tools.

BMI, for instance, has problems that relate to the loss in height and muscle with ageing. Issues include:

- ✓ Kyphosis makes it difficult to assess the true height of older people. However some studies have shown that age related loss of height does not significantly affect height calculations.
- ✓ There are problems in relation to the phenotype where the body size varies between ethnic groups. There is a lack of data on ethnic groups to help standardise BMI to take into account differences in body shape (Cormic Index, standing height/sitting height SH/S ratio) between populations.
- ✓ Armspan and knee height could be used as proxies for height, but their relationships with height have not been established for different ethic groups.

[6] World Health Organization (1995): Adults 60 years of age and older. In Physical Status: The Use and Interpretation of Anthropometry. Report of a WHO Expert Committee. Technical Report Series No. 854. Ch. 9. Geneva: world Health Organization.

- ✓ Although it is recommended to apply a correction factor for the population under study, the use of the Cormic index is not approved by WHO, and there is a limited number of people who have the skill to undertake the calculation. Those that have attempted to calculate found it tedious and time consuming and therefore not suitable for emergencies.
- ✓ Suitability, acceptability and availability of equipment is a problem which is aggravated by the fact that in emergencies it is often difficult to find hard vertical surfaces to support stadiometers and against which to place scales.

Although MUAC is easily used in the assessment of mortality and morbidity in children, there is no universally accepted cut off point for assessing the prevalence of acute malnutrition in adults and older people in emergencies. Issues arising for MUAC include:

WHO recommends the use of sex specific MUAC cut off points of 22cm for female and 23cm for men for chronic energy deficiency. Although MUAC, in conjunction with clinical criteria, is often proposed as a tool for rapid assessment for adults and older people, the outcomes of the various MUAC cut off points in relation to mortality and morbidity is not known.

- ✓ There is little information about how the BMI and MUAC change with ageing in Africa.

The Way Forward

Whilst some progress has been made towards increasing awareness and understanding of adults and older people's nutrition needs in emergencies, the lack of agreed standards for assessment has resulted in frustration among many practitioners. As a result, adults and older people are frequently excluded from nutritional assessments and interventions. In this context, urgent action is needed to promote constructive debate within a framework that will result in consensus.

- ➢ **For purposes of assessment and surveillance, data on MUAC and BMI should be collected and analysed.** Due to the lack of information in this area, every opportunity should be taken to use programme data to contribute to ongoing operational research. Specifically we need:

    - indices and cut-off points for defining acute malnutrition
    - performance indicators for assessing effectiveness of selective programmes for adults and older people

- ➢ **Where feasible, the nutritional status of adults and older people should be assessed using rapid nutrition surveys modified from the CDC/WHO cluster sampling methods to reflect the population of older people to meet statistical rigor.** Older people population could be estimated using census data if available or estimated as half that of children (10% of population).

- ➢ **When designing programme interventions at a population level, nutritionists should examine risk factors for older people at household and community levels.**

- **Some of the underlying causes** (at household and community level) and basic causes (at a population level) that may influence older people's vulnerability should be considered.

- **Qualitative information should be collected** on what the community perceives as indicators for nutritional vulnerability such as those in the Sierra Leone case. Qualitative information should include:

  - food security in terms of the typical diets eaten by adults and older people, the food and income source and use and the extent to which they have changed and differ from the general population.
  - normal community support structures, coping mechanisms specifically those that aim to take care of older people, and the extent to which they have broken down.

  Risk factors for individual older people should include:

  - clinical signs including kyphosis
  - socio-economic risk factors, (specifically living alone), presence of care givers, older people that care for children, income source, disability and immobility.

- **Since medical complications are common** in older people, an assessment of particular underlying chronic illnesses and heart problems is recommended

- **Agreement on guidelines/criteria** for the inclusion/exclusion of older people in assessments must be discussed at the start of an assessment. Joint assessments of older people along with other age groups are recommended. There is also need for a separate questionnaire for those caring for older people who are unable to express themselves.

- **Training in how to work with older people** and adults should be included as part of any nutritional response in an emergency. Specific training in the use of nutritional assessment tools is also required.

Conclusion

Great progress has been made in recent years in understanding and measuring the nutritional needs of adults and older people in emergencies. However, the lack of an agreed criterion for measurement leads to widely differing interpretations and possibly the exclusion of the most vulnerable in emergencies.

In light of the international aid community's commitment to acceptable standards of service provision in emergencies, and an adherence to best practice, a consensus should be arrived at, and protocols agreed, for inclusion in Sphere and other standards in the near future.

ANNEX 3.

Linking food security and nutrition information to understand the causes of child malnutrition: pitfalls and potentials.

By Claire Chastre and Sonya LeJeune, Save the Children UK

Introduction

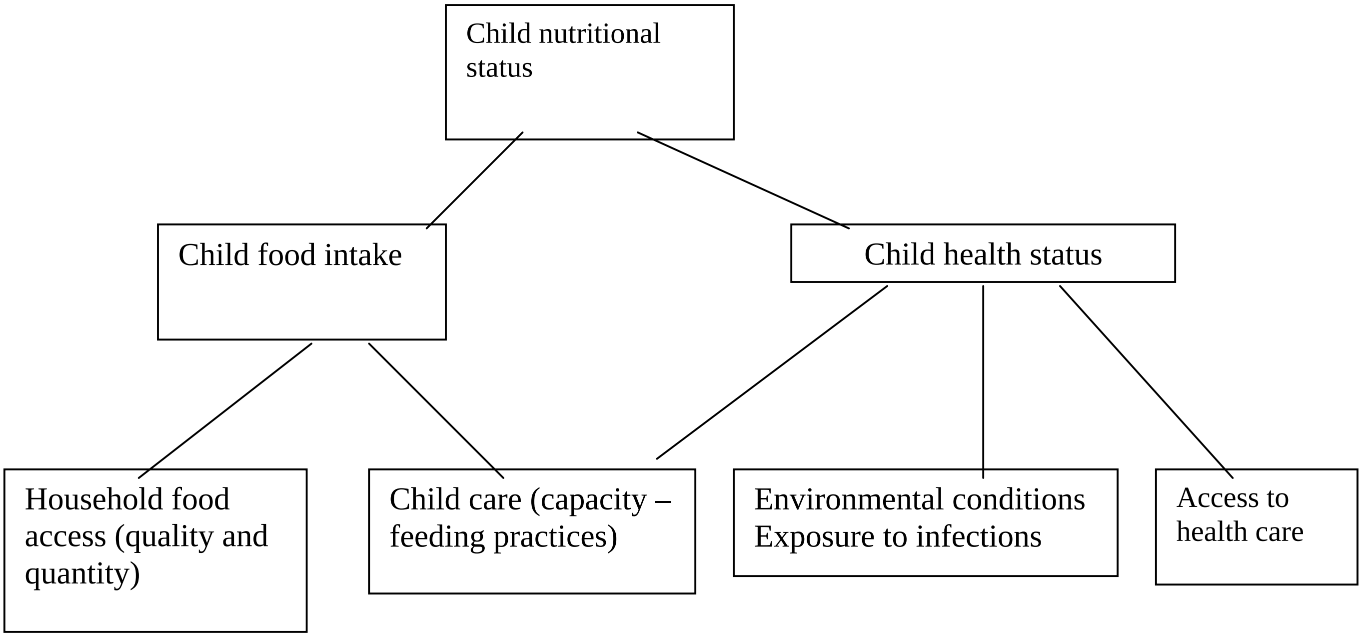
It has become the practice in several countries[1] to combine a food security component routinely with nutrition surveys, to provide the context, an explanation for the anthropometric results and finally to improve existing nutrition programmes and design appropriate interventions.

Such an approach (combined analysis and interpretation of food security and nutrition data) can greatly sharpen our understanding of the causes of malnutrition when conducted within a framework that also encompasses non-food related causes. However, if this is done poorly, it can also potentially lead to a biased interpretation of the findings/analysis of the situation. This, especially in contexts where the two following assumptions are commonly made: "there is food insecurity therefore there is child malnutrition" and there is child malnutrition therefore there is food insecurity"[2].

This paper considers the main features of nutrition surveys and food security assessments, in particular household economy assessments, and looks at what conclusions can realistically be drawn out of a joint analysis when conducted within a conceptual framework such as the causal model presented below (adapted from UNICEF). While it may appear that this paper states the obvious, we have found from experience that interpretation of data to understand malnutrition, and subsequently plan programmes, can be complex. The ensuing discussions have indicated the need for this paper to feed into the debate. Hopefully this will also be of some use for field workers in the same situation.

[1] Sudan and Burundi as examples

[2] Experience shows that this is not always the case. For example in Rwanda, discussion with parents in food insecure households revealed that they tended to reduce their food intake to ensure sufficient for their children. In North Sudan, a high level of malnutrition was in part explained by an earlier measles outbreak.



Nutrition surveys

Here we consider a common form of nutritional surveys[3], based on anthropometric measurement of a representative sample of children aged 6 – 59 months. Nutrition surveys show:

- Prevalence of acute malnutrition (measured with the weight/height index) amongst children 6-59 months at the time of the survey (i.e. the box 'Child nutritional status' in the causal model above)
- Information on health status, for example illness episodes, morbidity and mortality rates and vaccination coverage (see box 'Child health status' in the causal model).
- General contextual information with some idea of the food consumption

But generally they show the final result (nutrition status) and one possible causal factor (health).

Food security assessments

There are many different variations of approaches to food security assessment. Here we consider the household economy analysis (HEA) which provides a comprehensive framework for food and livelihood security analysis (compared to other approaches, which often focus mainly on agricultural production). The methodology is based on understanding the various options / strategies that people employ to secure access to food and cash. It explores how typical households from different wealth groups in a given area live. It also looks at how households cope when events / 'shocks' occur, by considering how they use these strategies for getting food and cash.

[3] Rapid nutrition surveys as routinely conducted in emergency contexts

Linking HEA and nutrition information

In terms of understanding malnutrition, HEA can provide insights into:

- Decision making processes at household level, options, priorities related to expenditure and food purchase.
- Strategies to access food and income in normal and in stress situations
- The seasonal variations of food availability and household food access (including the types of food accessed)
- Likely food shortage (how, when, why, how much, where) and the risk of reduced food access in the future
- Quantity of food that enters the household in relation to energy requirements
- Contextual information on livelihood systems and food economies

Information is usually provided for each wealth group over a period of time according to seasons.

Therefore HEA provides the information presented in the causal model under the box ‘Household food access’ and gives indication of possible food related causes of malnutrition.

Malnutrition is the result of a variety of possible factors, only some of which are food related. Therefore by analysing the food related causes in isolation of the other possible factors we risk misinterpreting the results. And even within the food-related causes, caution is necessary when considering the two sets of results because they have different features/characteristics (summarised in the table below).

	HEA	Nutrition survey
Unit of analysis	Household	Individual (child 6 - 59 months)
Data categorisation	Breakdown by socio-economic category	Prevalence relates to the entire 6 – 59 months or breakdown by age groups (i.e. no breakdown by wealth group)
Time period covered by the results	Tells of the situation over previous months Can make projections over coming months Describes seasonal variation	Reflects the situation at one point in time (snapshot)

From the table above it is clear that while anthropometric surveys describe an outcome (nutrition status), HEA describes processes. It is important to note that HEA assessments take the household as the unit of analysis whereas nutritional surveys use the individual (child 6 – 59 months). A cause – effect relationship can not be drawn without considering the intermediary level: the intra household food distribution and the child’s food intake/utilisation. Without any intra-household information, for instance, one cannot rule out the possibility that food insecure households may preferentially feed the younger children during difficult periods.

Nutrition surveys and HEA do not categorise data in the same way for analysis. HEA data is analysed by wealth group, whereas nutrition surveys relate to ALL children within the population. Therefore the results are not directly comparable.

It is equally crucial to take into account the timeframe and the dates at which the assessments were conducted. For example, if a household food deficit translates into inadequate food for the child, the impact of this on the nutritional status might not be seen straight away.

Conclusion

With the right approach, food security and nutrition information can complement each other, as illustrated by the case studies attached. When combining nutrition and food security assessments in order to better understand the causes of malnutrition the field worker needs to assess the reliability and the coverage of the data to know how far the interpretation can go. It is easy to misinterpret results if sufficient factors have not been looked at. However a well conducted joint analysis of the food security situation with a nutrition survey can lead to better programming and more appropriate intervention.

Case study 1: Liberia (Vahun County, 1998),

A nutrition survey was conducted at the same time as a food security assessment.

The anthropometric results indicated that one specific age group amongst the 6 – 59 months presented a higher malnutrition prevalence than the others. Meanwhile, the food security assessment indicated that newly arrived refugees were more confronted with food insecurity than the residents and the old caseload refugees. Based on a combined analysis of food security, nutrition, water and health data, the main factors associated with malnutrition were identified as follows: poor access to food amongst the households newly arrived in the area and insufficient access to drinking water resulting in a high incidence of diarrhoea amongst children. This analysis led to programmes such as food aid distributions, improvement of the water supply and an increase in capacity to treat malnutrition. It also led to the refinement of the criteria for targeting within the home visiting programme. Because of limited resources, it was not possible to visit all the households with children of the age group the more affected by malnutrition. Based on the information provided by the combined analysis, home visits were targeted at recently arrived refugees having children within the specific age group.

Case study 2: Northern Sudan (Northern Darfur State, 2000)

A nutrition survey was conducted at the same time as a household economy assessment.

The HEA predicted a food deficit, based on poor cereal production, high grain prices and low groundnut prices. The anthropometric survey showed a high rate of global malnutrition and also signs of Vitamin A deficiency. An assessment of the morbidity rates, as part of the nutrition survey, showed that there had recently been a measles epidemic. If the malnutrition rates had been interpreted on the basis of the food deficit alone, the role of the measles epidemic as a major contributing factor would have been overlooked.

Case study 3: Bugesera (Kirundo province, Burundi)
The province of Kirundo[4] in Burundi was confronted with three consecutive years of inadequate rainfall which led to a reduced crop production. Three nutritional surveys and two Household Food Economy assessments were conducted between January 1999 and January 2001. The HFE assessments covered the area most affected by the drought within Kirundo province: the Bugesera agro-ecological zone.

Results (case study 3)

The two nutritional surveys conducted in September (1999 and 2000) showed very similar results (see table below). The main difference between the two September surveys and the January survey is the presence of a high prevalence of oedema in January 1999. This included a large proportion of mild oedema. All three surveys used the same methodology.

	Global acute malnutrition	Severe acute malnutrition – without oedema	Severe acute malnutrition – with oedema[1]
January 99	13.0% (9.1 – 16.1%)	1.2% (0.6 – 2.2%)	4.9% (3.1 – 7.3%)
September 99	7.3% (4.6 – 10.2%)	0.7% (0.1 – 1.3%)	0.3% (0.0 – 0.8%)
September 00	6.8% (4.7 – 9.7%)	0.9% (0.3 – 2.2%)	0.3% (0.1 – 0.7%)

Health centres are generally poorly equipped and understaffed and access to curative and preventive health services is limited.

Food and cash income from own production is traditionally earned during the first seven to eight months of the year. This was the case in 2000 although the two main harvests were reduced compared to normal. The poorest households coped through a set of strategies that they do not use normally or use to a lesser extent. Amongst others, these households reduced their overall food consumption while protecting their children's food intake. They resorted to eating food they would not normally eat. Migration in search of labour increased, and was the main source of food and income for these households. These strategies allowed households to cover their minimum energy requirements over the first eight months of the year.

The projections from the July 2000 assessment for the last months of the year anticipated

- an increased reliance on the labour market to access food and income in an almost saturated labour market along with an increase of basic commodities prices
- In the absence of intervention, this assessment projected that the poorest households would be confronted with a food deficit over the last four months of the year 2000.

During the last part of the year, only half of the food recommended was distributed. The food distribution did not take place when food insecurity was expected to be at its highest: November. In addition, the area was hit by epidemics in November.

[4] The majority of the people in the province are engaged in agriculture and pastoralism.

Analysis (case study 3)

When analysing jointly the two sets of information, one must keep in mind that the areas of coverage differ slightly. The nutritional survey covers a wider zone (the whole province), which is not uniform in terms of food security.

Coping strategies protected the children's food intake. Therefore the nutrition status of children had not yet been affected by September 00. Alternatively, it is possible that it had affected the nutritional status of children in Bugesera coming from the poorest households but the overall results do not show this because the nutrition survey refers to children from the whole province and for all the socio-economic groups combined.

Moreover, the predictive value and seasonal analysis of FEA are important for the understanding of malnutrition and should be taken into account when planning a nutritional survey. It was justified to request a survey in September 2000 because it was not clear at that stage how much the households' reduction in food intake had impacted the children and also this was a good option to analyse trends by comparing the results with the previous survey. However, the interpretation of the results must take into account that the survey was conducted just after the easiest part of the year and just before food insecurity was expected (in the absence of intervention). Arguably one might have wanted to conduct the survey a bit later in the year in order to cover the possibly worst period.

In that case, it is important to understand the correlation and the sequencing of the different events: epidemics and seasonal variations in food access in the overall long standing context. Time of the event versus time it impacts on nutritional status.
The January harvest might not have made an immediate and significant change on the nutritional status of children. Assuming that all the information provided in the assessments and surveys are reliable, one could possibly explain the high prevalence of oedema in January by the change of diet and/or the end of the difficult period.

So, taking into account seasonal factors, nutritional surveys alone have a limited value over time in terms of planning interventions. For example, after the September 00 nutrition survey, the nutritional status is likely to have worsened given the food distribution problems and the epidemics (as happened in neighbouring provinces). So we can not rely anymore on the results of the nutritional survey whereas the food security data have a value over time.

ANNEX 4.

A method for estimating mortality rates in humanitarian emergencies using previous birth history

Mark Myatt & Anna Taylor, June 2002

Introduction

Traditionally, prevalence (e.g. the prevalence of undernutrition) and incidence (e.g. mortality) have been measured using two quite different epidemiological methods. These are:

> Prevalence : Cross-sectional surveys such as the modified EPI 30 cluster survey commonly used to estimate the prevalence of undernutrition.
>
> Incidence : Surveillance (monitoring) systems such as monitoring of burial places, routine reports from (e.g.) street leaders in refugee camps, routine reports of deaths in hospital from curative services.

Surveillance systems usually require a reasonably stable situation and reliable population estimates. They also take a considerable time to establish and need to run for some time before data can be meaningfully analysed. These factors make them unsuitable for estimating mortality in emergency assessments. It is possible to estimate *cumulative incidence* retrospectively using a cross-sectional survey. This is currently the recommended method for estimating mortality in emergencies. There are, however, problems to this approach with regard to estimating mortality rates:

> Manipulation : Any emergency assessment is prone to manipulation by an aid-savvy population or regime. Such manipulation will, generally, lead to an overestimation of incidence.
>
> Taboo : In some cultures death is a taboo subject. This makes asking questions about deaths problematic and will lead to an underestimation of mortality.
>
> Unreliability : Many handbooks on emergency assessment mention the importance of estimating mortality rates but provide scant details on exactly how this should be done. Whilst reviewing reports of emergency assessments we found that a variety of methods were used. Many of these assessments committed one or more gross methodological blunders. The most common of which was nesting of the mortality survey within a nutrition survey thereby excluding households in which all children under five years of age had died leading to underestimation of mortality. In general, the methods used lacked standardised procedures for defining households, enumerating household members, selecting the principal informant, ascertaining whether identified household members were living at home during the survey period, failed to define live-births, and did not have a standardised question set. This lack of standardisation is likely to lead to large

within and between observer variation within a single survey and, perhaps more importantly, large variations between surveys due to methodological problems and inconsistencies rather than to differences in underlying mortality rates.

Lack of guidance on sample size calculations and data-analysis procedures : Current editions of handbooks on emergency assessment do not provide details on how sample sizes should be calculated and offer conflicting advice on minimum sample sizes which are couched in terms of a minimum number of individuals or households rather than units of person-time-at-risk (i.e. the product of the number of individuals followed-up and the duration of the follow-up period). Key analytical procedures such as the calculation of a confidence interval on an estimated rate are also not covered in these handbooks.

Given these problems with the way mortality is currently estimated in emergency assessments, SCF(UK) decided to design and undertake preliminary testing of a method that might overcome these problems.

Desirable attributes of a method

The first step in designing the new method was to decide on a set of desirable attributes. After some deliberation, the following list was arrived at:

Familiar sampling method : The new method must be able to use proximity sampling of households as is used in most variants of the EPI 30 cluster method because most workers in the field are already familiar with this method (e.g. it is a commonly used method for assessing the nutritional status of a population in emergency situations). Other methods (e.g. simple random sampling, systematic sampling, stratified sampling, and adaptations of the EPI method) may be also be used.

Reliable : The new method must use a standard validated question set applied to a single informant with a single relationship to the deceased.

Low overhead : The new method must have low resource overheads. It must be possible for data to be collected by a single enumerator. The data must be also be simple to collect. The method should not require entry of large volumes of data onto computer. The data must be simple to analyse and not require the use of specialist computer software.

Resistance to manipulation and taboo : The intent of a mortality survey using the new method must not be obvious (i.e. it must not be obvious that data is being collected on recent deaths). The question set used must avoid any mention of death.

In addition, it was decided that simple tools for sample-size calculation and the calculation of a confidence interval on an estimated rate should be developed and placed in the public domain. It was decided that these tools should be general to the problem of estimating a single rate rather than being tied to the new method.

Which mortality rate to estimate?

These considerations led to the decision to estimate under five years mortality rather than all-age mortality (crude mortality, CMR). Estimating under five years mortality has the following advantages:

A single informant with a single relationship to the deceased may be used (i.e. mothers).

A standard validated question set (the UNICEF 'previous birth history' (PBH) method) is already available. This question set makes no mention of death and has low data collection and analysis overheads. The PBH question set is shown in box 1. The flow of questions in the PBH question set is illustrated in figure 1.

An additional rationale for estimating under five years mortality rather than all-age mortality is that the under five years population is an *early warning population* (i.e. mortality is likely to rise in this population before it rises in the general population).

One disadvantage with the proposed method is that *maternal orphans* are excluded by the requirement that only living mothers are interviewed. It might be expected that the survival probabilities of maternal orphans are considerably lower than children whose mothers are still alive. This will cause any method based on the PBH question set to underestimate mortality. The degree to which this underestimates mortality will depend upon the maternal mortality rate. Underestimation may be a particular problem in situations of exceptionally high maternal mortality coupled with high under five years mortality due to (e.g.) HIV / AIDS or malaria epidemics in areas of unstable malaria endemicity. This problem was not considered in the development and testing of the method reported here.

Most emergency handbooks concentrate on collecting data to estimate both crude mortality and under five years mortality. This approach is superficially attractive but is subject to the problems of manipulation, taboo, and unreliability mentioned earlier. Estimates of under-five mortality from such surveys are likely to lack precision due inadequate sample sizes.

It should be noted that under five years mortality is **not** an appropriate indicator for initial assessments undertaken where considerable under five years mortality has occurred prior to the start of the follow-up period (e.g. initial assessments undertaken very late in an unameliorated nutritional emergency) or in situations where mortality is likely to be highest in the adult or elderly population.

Data arising from the PBH question set

The PBH question set yields three variables per mother. These are:

The number of **children at risk**

The number of **new births** in the survey period

The number of **new deaths** in the survey period

Such a small number of variables allows data collected from each mother to be summed by hand. Cluster or community level tallies can also be summed by hand. It is even possible to sum the cluster level tallies and calculate mortality rates directly although calculation of confidence intervals is complicated if a multi-stage sample (e.g. cluster) sample is used. Hand calculation of mother and cluster tallies reduces the data-entry overhead to just three items per cluster (i.e. 90 data items for a 30 cluster survey).

Analysing the PBH data

Survey level totals plug directly into the standard mortality estimation formula:

$$\frac{\textit{new deaths}}{\textit{children at risk} - \tfrac{1}{2}\textit{ new deaths} + \tfrac{1}{2}\textit{ new births}} * \textit{rate multiplier}$$

The *rate multiplier* is the reference population (e.g. per 1,000, per 10,000) divided by the number of periods of follow-up (e.g. 90 days).

Calculation of confidence intervals relies on:

$$\frac{\textit{new deaths}}{\textit{children at risk} - \tfrac{1}{2}\textit{ new deaths} + \tfrac{1}{2}\textit{ new births}}$$

being a proportion or *period prevalence*. Confidence intervals for a proportion from a two-stage cluster sampled survey may be calculated using the standard formula:

$$95\%\ CI = p \pm 1.96\sqrt{\sum_{i=1}^{k}\frac{(p_i - p)^2}{k(k-1)}}$$

Where:

p	=	proportion observed in whole sample
p_i	=	proportion observed in cluster i
k	=	number of clusters

Use of this formula accounts for variance loss (i.e. the *design effect*) due to the use of a two-stage sampling method. The format of the data and the equations required to calculate rates and confidence intervals are simple enough for all calculations to be performed using standard spreadsheet packages. Figure 2 shows an example spreadsheet created using Microsoft Excel. This spreadsheet is available (in Microsoft Excel '95 format) from: http://www.myatt.demon.co.uk/samplerate.htm

This is a general tool and may be used to calculate rates and confidence intervals on count data collected using a two-stage cluster sampled survey.

Sample size calculation

Required sample sizes can be calculated using the standard formula:

$$n = \frac{\mu}{e^2}$$

Where:

	=	rate
e	=	required size of standard error

For example, the sample size required to estimate a mortality rate of 2 / 10,000 persons / day with a 95% confidence interval of ± 1 / 10,000 persons / day using simple random sampling is:

$$n = \frac{0.0002}{(0.0001 / 1.96)^2} = 76{,}832 \text{ person-days-at-risk (PDAR)}$$

This person-days-at-risk (PDAR) figure may be expressed as the number of children for which survival data should be collected by dividing the PDAR by the length of the follow-up period:

$$\text{n(children)} = \frac{\text{PDAR}}{\text{length of follow-up period in days}}$$

For example, with a follow-up period is 90 days, data on the survival of:

$$\text{n(children)} = \frac{76{,}832}{90} = 854$$

children is required. This may be expressed as the number of mothers that should be interviewed by dividing this figure by an estimate of the average number of children under-five per mother alive at any time during the follow-up period:

$$\text{n(mothers)} = \frac{\text{n(children)}}{\text{average number of children} < 5 \text{ years per mother}}$$

More complex sampling strategies (e.g. the EPI 30 cluster method) can be accommodated by multiplying the calculated sample size by the expected design effect (usually estimated to be 2.0).

A sample-size calculator that implements the PDAR calculation has been developed and placed in the public domain. The sample size calculator is available from: http://www.myatt.demon.co.uk/samplerate.htm. The sample-size calculator is a general tools for use with any survey that estimates a single rate.

Experiences in the field

A preliminary test of the proposed method was undertaken in four food economy zones (FEZ) in Northern Darfur, Sudan in January and February 2002. The start of Ramadan was used as the start of the recall period. Data was collected using a two stage cluster sample. Sample size requirements were calculated as follows:

Rate to estimate :	2 / 10,000 persons / day	
95% CI (±) :	1 / 10,000 persons / day	
Expected design effect :	2.0	
PDAR :	153,664	
Average length of follow-up period (days) :	80	
Sample size (children) :	1921	(i.e. 153, 664 80)
Average number of children < 5 years per mother :	2.0	
Sample size (mothers) :	961	(i.e. 1921 2.0)
Cluster size (mothers) :	26	
Minimum number of clusters of size 26 required :	37	(i.e. 961 26)

For each test survey, data was collected using 38 clusters of 26 mothers (one extra cluster was sampled to ensure that the sample size requirement was met even if one or two clusters were located communities with less than 26 mothers). The required sample size was met in three of the four food economy zones (table 1). The expected design effect of 2.0 that was used to calculate the required sample size proved to be an overestimate and the sample sizes collected were sufficient to estimate the expected rate with a precision better than the specified ± 1 / 10,000 persons / day.

The following procedures and definitions were used in the surveys:

All women in the reproductive age range in a selected household were questioned.

Births were defined as live births. A distinction was made between live births and still births or miscarriages. Live born children were defined as those born alive even if the child died immediately after birth. A baby who cried or breathed, if only for a few minutes, counted as a live birth.

The results of these surveys are summarised in table 1. It was not possible to validate these results by comparison with surveillance data but the mortality rates reflect the findings of nutrition surveys undertaken at the same time in the same villages (i.e. the Tombac area was characterised by higher prevalence of undernutrition by MUAC than by weight-for-height z-scores and a high prevalence of oedema).

Data proved both easy and rapid to collect with enumerators taking no longer than the teams measuring children for concurrent nutrition surveys. Data analysis was also straightforward.

Further work

The results of the initial testing are promising but further work is required to:

<u>Validate the estimates arising from the proposed method</u> : This may be easiest to do in a refugee camp where routine monitoring of deaths is undertaken. Validation should be a relatively rapid process given that random or systematic samples may be used. Other overheads (e.g. travel costs) should also be low.

<u>Establish reasonable design effects for use in sample size calculations</u> : The pilot surveys used an expected design effect of 2.0 in order to calculate the required sample size for each survey. This produced estimates with a reasonable degree of precision. The test surveys presented here yielded negligible design effects. It is possible that, as experience with the method grows, the expected design effect may be revised down thus reducing costs

<u>Establish benchmark values for the interpretation of under five years mortality</u> : The benchmarks that are currently used to interpret under five years mortality are derived by doubling those used to interpret crude mortality (table 2). Under five years mortality may be subject to higher regional variation than crude mortality and simple global benchmarks may prove inappropriate. This problem may be assessed by a desk review of mortality data and appropriate benchmarks developed.

<u>Use of the methods with alternative sampling methods</u> : The EPI survey method is limited to producing an overall estimate of mortality for a survey area. If estimates of mortality estimates are required at village level then other sampling strategies (e.g. sequential sampling plans) could be used. At present there is no experience with using the proposed method with alternative sampling methods.

Box 1: The PBH question set

Have you ever given birth?

    If NO, then STOP

When was your most recent birth?

    If more than 5 years ago, then STOP

Was this before or after [START DATE]?

    If after start of [START DATE], then ADD 1 TO NEW BIRTHS

Where is this child now?

    If ALIVE, then ADD 1 TO KIDS AT RISK

    If DEAD, then:

        Did this child die before or after [START DATE]?

        If child died after [START DATE], then:

            ADD 1 TO NEW DEATHS, ADD 1 TO KIDS AT RISK

Did you have a birth before this child?

    If NO, then STOP

    If YES ... REPEAT for previous birth

Figure 1: **The flow of the PBH question set**

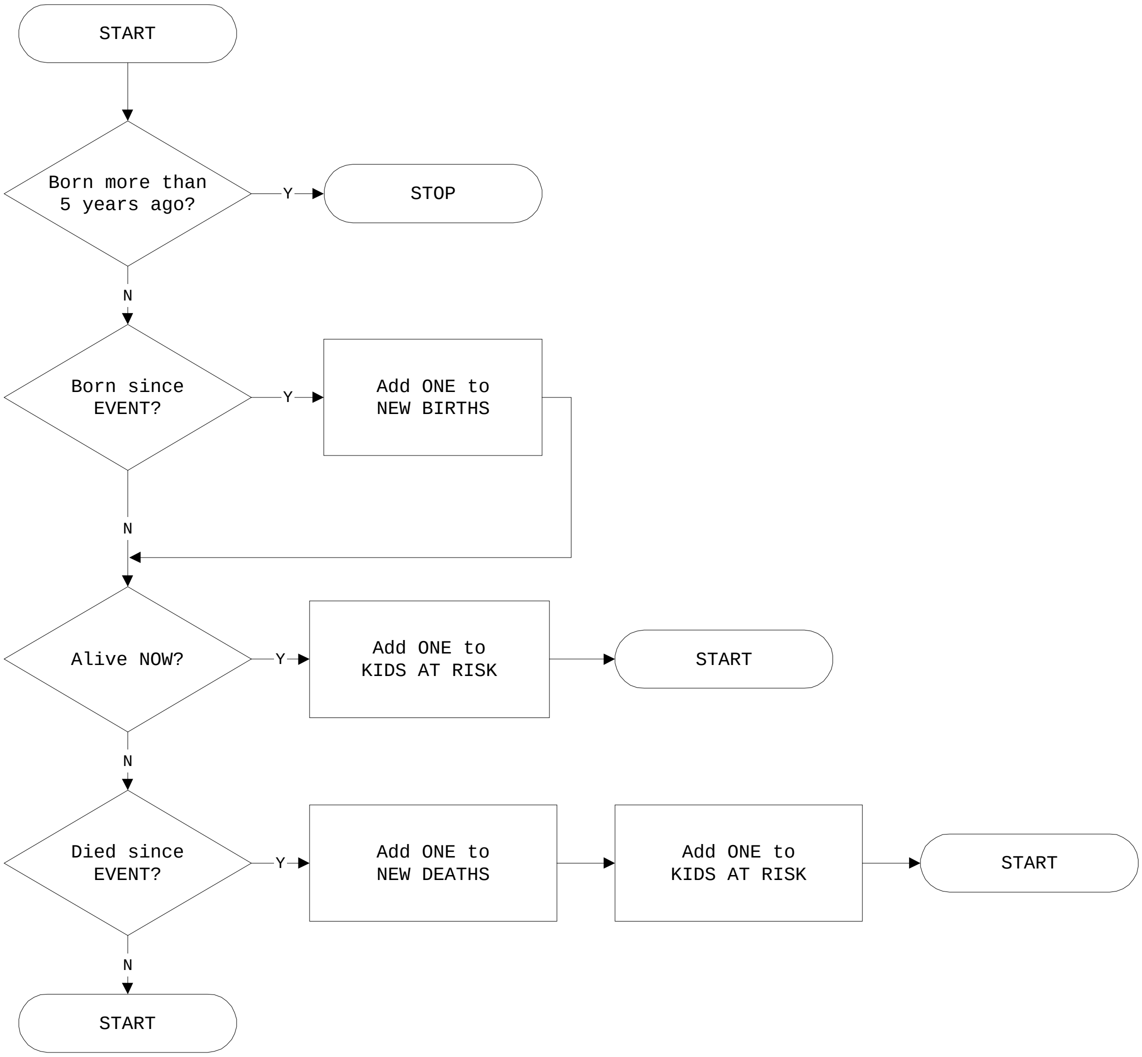


Figure 2: Example spreadsheet for calculating a 95% confidence interval

Microsoft Excel - u5mr.xls

File Edit View Insert Format Tools Data Window Help

	A	B	C	D	E	F	G	H
1	Cluster	At risk	New BIRTHS	New DEATHS	#		Number of clusters (k) :	30
2	1	56	2	1	6.9E-09			
3	2	48	1	2	8.3E-07		Days since start event :	90
4	3	64	3	1	1.9E-11			
5	4	35	2	1	1.9E-07		Rate is per ... per day :	10000
6	5	58	1	0	2.7E-07			
7	6	61	2	2	3.5E-07		Rate Multiplier :	111.11
8	7	60	1	1	2.3E-09			
9	8	67	2	1	2.3E-10		New DEATHS recorded :	24
10	9	33	0	1	2.8E-07			
11	10	45	4	1	4.5E-08		New BIRTHS recorded :	68
12	11	52	3	1	1.5E-08			
13	12	49	2	1	2.8E-08		Mid-year population :	1573
14	13	59	3	0	2.7E-07			
15	14	47	4	0	2.7E-07		Proportion :	0.0153
16	15	57	3	1	4.5E-09		- Standard error :	0.0025
17	16	39	2	1	1.2E-07		- 95% LCI :	0.0104
18	17	53	2	0	2.7E-07		- 95% UCI :	0.0201
19	18	52	3	2	6.0E-07			
20	19	55	2	0	2.7E-07		**Rate :**	**1.6953**
21	20	50	3	1	2.2E-08		**- 95% LCI :**	**1.1564**
22	21	49	2	1	2.8E-08		**- 95% UCI :**	**2.2342**
23	22	53	1	0	2.7E-07			
24	23	40	2	0	2.7E-07			
25	24	77	3	2	1.3E-07			
26	25	44	2	0	2.7E-07			
27	26	57	0	1	6.9E-09			
28	27	55	1	0	2.7E-07			
29	28	54	3	2	5.3E-07			
30	29	45	5	0	2.7E-07			
31	30	37	4	0	2.7E-07			
32	OVERALL	1551	68	24	6.1E-06			

u5mr

Figure 3: **Sample size calculator**

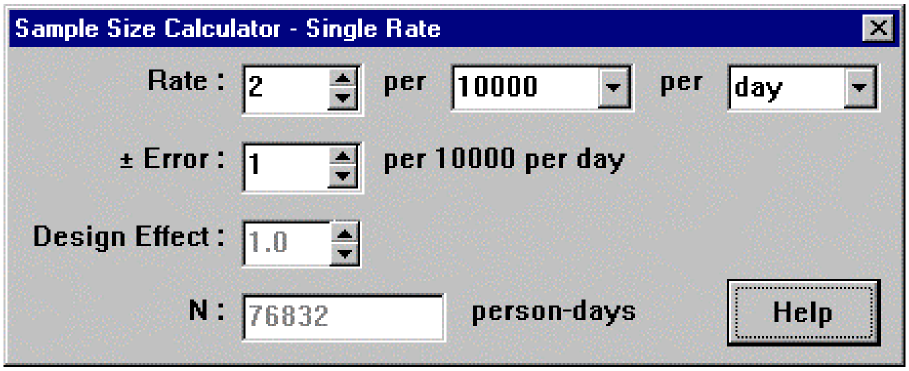


Table 1: Results of for retrospective mortality surveys in North Darfur, February 2002

FEZ	Child days at risk	Percentage of sample size met	Rate / 10,000 / day (95% CI)	Design effect	Interpretation
Goz	162,891	106%	0.92 (0.40, 1.44)	1.11	Normal
Tombac	166,536	108%	3.78 (3.07, 4.49)	0.77	Elevated - possibly serious situation
Pastoral	178,432	116%	0.23 (0.02, 0.43)	0.91	Normal
Non-wadi	139,435	91%	0.65 (0.25, 1.05)	0.95	Normal

Table 2: **Benchmarks for the interpretation of mortality rates**

CMR deaths / 10,000 / day	U5MR deaths / 10,000 / day	Interpretation
0.5	1	Normal rate
< 1	< 2	Elevated, cause for concern
1 - 2	2 - 4	Elevated, serious situation
> 2	> 4	Elevated, very serious situation
> 5	> 10	Elevated, major catastrophe

ANNEX 5.

Summary of Nutrition and Health Survey Badghis Province, Afghanistan February – March 2002

A collaborative survey by:
UNICEF and U.S. Centers for Disease Control and Prevention (CDC)

The following persons authored this report and are responsible for its content:

Bradley A. Woodruff
Meredith Reynolds
U.S. Centers for Disease Control and Prevention
Atlanta, Georgia USA

Felicite Tchibindat
Cyridion Ahimana
UNICEF – Afghanistan Country Office

ACKNOWLEDGMENTS

Although this survey was funded by UNICEF, it was the work of many people from many organizations. The authors thank those attended the workshop in Mazar-i-Sharif where many valuable suggestions were discussed.

Many other UNICEF staff contributed to various aspects of this survey, including Peter Salama, Head of the Health and Nutrition Section of the UNICEF – Afghanistan Country Office. Dr. Simon Azariah of UNICEF and Dr. Mesfin Teklu of World Vision assisted with much of the preparatory work. In addition, many UNICEF national staff did translations and backtranslations, provided the information necessary to construct the local calendar, and offered invaluable advice on all aspects of the survey.

The Ministry of Public Health of Herat Province provided the personnel who acted as survey team supervisors. The Office of the Governor of Badghis Province, especially Mr. Zaudin, provided advice on logistic matters, including identification of the location of selected villages.

The Norwegian Project Office/ Rural Rehabilitation Association for Afghanistan (NPO/RRAA), the Danish Committee for Aid to Afghan Refugees (DACAAR), Ockenden International (OI), and Oxfam-UK provided lists of villages in Badghis Province. These lists were essential to carrying out the survey sampling.

Major partners of UNICEF provided general advice and overall coordination: the World Food Programme (WFP), the World Health Organization (WHO), and the United Nations Office for Coordination of Humanitarian Affairs (UNOCHA).

The authors offer special thanks to the survey workers (listed in appendix 1) whose intelligence, dedication, and overall competence in the face of extreme logistical difficulties made this survey possible.

GOALS AND OBJECTIVES

The overall goal of this survey is to assess the health and nutritional status of children less than 5 years of age and women of reproductive age (15 – 49 years of age). This assessment will be used to establish baseline data for a nutritional surveillance system and to provide recommendations to national and international organizations providing health and nutrition services.

The specific objectives of this survey are to estimate:

- The prevalence of salt iodation
- The prevalence of acute and chronic malnutrition in children less than 5 years of age
- The prevalence of clinically apparent anemia and vitamin deficiencies (riboflavin and vitamins A, C, and D) in children less than 5 years of age
- WHO breastfeeding indicators
- The two-week cumulative prevalence of diarrhea and acute respiratory infection in children less than 5 years of age
- The prevalence of malnutrition in women of reproductive age (15-49 years of age)
- The prevalence of iodine vitamin A deficiency in women of reproductive age
- The reproductive history of women of reproductive age
- Crude mortality rate and causes of death
- Age-specific mortality rates, including the mortality rate among children less than 5 years of age
- The coverage of recent measles vaccination campaigns among children 9 months to 5 years of age

Data were collected by 17-31 March 2002 on 507 households with 545 children les than 5 years of age and 555 women 15-49 years of age by 5 teams of 4 persons each. Each team included a supervisor, a logistics coordinator, and two interviewers (one female and one male). All supervisors were medical doctors. All survey workers received 4 days of classroom training and 1 day of field practice training under close supervision. During data collection for the first cluster done by each team, an expatriate supervisor or consultant from UNICEF monitored each team.

At each household, interviewers asked questions about displacement and water source for the household. In addition, a household census was taken as of Eid Qurban of the previous year (1379 in the Afghan calendar; 13-16 February 2001 in the Gregorian calendar). Births and deaths occurring in each household between Eid Qurban and the date of the survey were recorded along with month of occurrence. A local calendar of events was used to determine ages of household members and dates of death. The cause of each death was classified into 1 of 11 categories (war related injury, non-war related injury, measles, tetanus, watery diarrhea, dysentery, meningitis, pneumonia, malaria, scurvy, or other) using a hierarchical series of questions adapted from a WHO recommended protocol for verbal autopsies (see appendix 4 for the questions used). [6] A sample of salt from each selected household was tested for iodine content.

Survey workers asked questions of each woman of reproductive age in each household regarding nightblindness, number of pregnancies, number of births, date of last delivery, and tetanus vaccination history. In addition, an examination for goiter was performed and each woman had mid-upper arm circumference (MUAC), height, and weight measurements taken.
Information was gathered from an adult household member, preferably the mother, on each child less than 5 years of age regarding nightblindness, breastfeeding history, vitamin A supplementation and vaccination history, and recent diarrhea and acute respiratory infection. Because vaccination cards have not been issued during recent mass immunization campaigns, mothers' reports were taken as evidence of vaccination against measles and receipt of vitamin A supplementation. BCG vaccination was confirmed by examination for a characteristic scar on the child's left arm.

The physician supervisor performed a physical examination targeted to signs of micronutrient deficiency. Survey workers then measured the child's weight and height. Children less than 5 years of age and women of reproductive age were weighed to the nearest 100 grams with UNICEF Uniscale. For children less 24 months of age, length was measured to the nearest millimeter in the recumbent position using a standard height board. Children 24 months of age or older were measured in a standing position. Women's height was measured using a portable stadiometer while the woman was standing against a vertical surface or support. MUAC in women was measured using a standard measuring tape. Body mass index (BMI) was calculated as weight in kilograms divided by the square of the height in meters.

CONCLUSIONS AND DISCUSSION

I. Household characteristics

Water supply
Overall, the accessibility and quality of water is poor for households in Badghis Province. Most households depend on unsafe sources for their water supply. Moreover, the members of many households spend substantial time obtaining this water.

Food
Food aid has not been universally received by households in Badghis Province. Iodine is virtually absent from salt consumed in Badghis households.

II. Child nutrition

Acute malnutrition
Acute protein-energy malnutrition, although not uncommon, is not currently an overwhelming public health problem among children less than 5 years of age in Badghis Province. Among these children, only children 12-23 months of age appear to be at elevated risk of acute malnutrition. Infants less than 12 months are not at disproportionate risk.

The shape of the distribution curve of weight-for-height z-scores and the relatively low standard deviation imply that the anthropometric measurements taken during the survey are relatively precise. Moreover, these measurements are probably accurate given that Uniscales were used to measure weight and survey supervisors carefully checked the accuracy of the height boards used to measure height and length.

In some severe emergency situations elsewhere, high mortality among children less than 5 years of age has decreased the apparent prevalence of acute malnutrition. Malnourished children had died, leaving only those with better nutritional status to be measured in a survey. However, this is probably not the situation in Badghis Province given the mortality rate measured in children less than 5 years of age. Although this rate is elevated above baseline, it is not nearly as high as the age-specific mortality rates measured in the extreme situations mentioned above.

The level of acute malnutrition among children in Badghis Province may not, in and of itself, justify extensive feeding programs. Nonetheless, communicable diseases, especially dysentery, can, even in the absence of severe food shortage, have an important affect on nutrition status. The level of morbidity and mortality due to pneumonia and diarrhea in Badghis Province, in combination with the somewhat elevated prevalence of acute malnutrition, may justify enrollment of malnourished children in targeted supplementary feeding programs. Moreover, a small hospital-based therapeutic feeding program may be necessary for the relatively few children with severe acute malnutrition. Nonetheless, there is little justification for blanket supplementary feeding or implementation of specialized therapeutic feeding centers.

Chronic malnutrition
In contrast to acute malnutrition, chronic malnutrition is a very common problem affecting all age groups of children less than 5 years of age. The prevalence of severe chronic malnutrition among children 12 months of age and older is of special concern.

Risk factors for malnutrition
The lack of association between receipt of food aid and either acute or chronic malnutrition in children may indicate that one-time or sporadic food distributions, as carried out in Badghis Province this past winter, have had no effect on children's nutritional status.

There is a clear association between mothers' nutritional status and the presence of acute malnutrition in their children less than 5 years of age. Unfortunately, a cross-sectional survey cannot determine if this is a cause-effect relationship. It may be true that in households with insufficient food, all members become malnourished. On the other hand, there may be mechanisms by which maternal nutritional status may directly influence child nutrition status.

Regardless, provision of food to households with malnourished members may assist in the recovery of all malnourished household members.

Micronutrient deficiencies

Signs and symptoms of several micronutrient deficiencies are not uncommon among children less than 5 years of age in Badghis Province. The prevalence of Bitots spots exceeds the widely accepted threshold of 0.5% which defines vitamin A deficiency as a public health problem. In addition, only about one-half of children have received vitamin A supplementation at any time in their lives.

The gum signs of scurvy are present in children less than 5 years of age, especially in children older than 12 months. However, these signs may be due to many conditions, such as poor oral hygiene. The more specific signs, including widespread bruising and perifollicular hemorrhage, are absent or much less common. Although scurvy has been widely reported in western and central Afghanistan, the results of this survey do not clearly indicate that scurvy is a widespread, serious problem in Badghis Province in children less than 5 years of age at this time.

On the other hand, relatively specific signs of rickets, including rachitic rosary at the rib-cartilage junction and bowed legs, are more common. This may indicate that vitamin D deficiency is a problem among children less than 5 years of age, especially those 24 months of age and older. In other countries, vitamin D deficiency is a seasonal condition which largely resolves in the summer months when children spend more time outdoors in sunlight.

Although angular stomatitis is present in children in Badghis Province, it can result from may causes, including fungal infection, iron deficiency, and others. In populations with widespread riboflavin deficiency, angular stomatitis can often be identified in a much larger proportion of the population. For example, in Bhutanese refugee adolescents, angular stomatitis was found in 29% of those included in a population-based random sample.[9] For these reasons, we cannot definitively conclude from the results of this survey that riboflavin deficiency is a serious or widespread public health problem in young children in Badghis Province

Pallor is usually noted only in persons with moderate and severe anemia. For this reason, the prevalence of 8.5% noted in this survey indicates that anemia may be quite common in children less than 5 years of age in Badghis Province. The most likely cause of anemia is iron deficiency, and other causes are probably much less common. The climate in Badghis Province may be incompatible with widespread helminth infection; helminth eggs generally do not survive cold winters or dry conditions. Moreover, because the survey was done at the end of winter, malaria infection was probably rare.

Infant feeding

Overall, breastfeeding is widespread and prolonged in Badghis Province, and feeding with formula or dried milk and use of a baby bottle are very uncommon. Introduction of complementary foods is recommended by age 6 months; however, in Badghis Province, complementary foods are not introduced early enough in infancy for many children. Because this survey collected no data on the types of complementary foods, we can make no conclusions regarding the quality of complementary feeding.

III. Child health and vaccination

Diarrhea and acute respiratory infection appear to be very common in children less than 5 years of age in Badghis Province during the weeks before survey data collection. Moreover, these illnesses cause the majority of deaths in this age group.

Measles vaccination coverage is poor and is probably not interrupting measles virus transmission. Although some clusters, and therefore villages, have nearly universal coverage, there were many more which had intermediate or no coverage. Moreover, measles accounted for 6% of deaths in children less than 5 years detected by the survey.

The lack of BCG vaccination indicates that post-natal care is inadequate. Presumably, the coverage for DPT vaccine, which is also given early in infancy and is not included in mass vaccination campaigns, is also very low.

IV. Women of reproductive age

Nutritional status
The prevalence of severe and moderate malnutrition among women of reproductive age in Badghis Province is not greatly elevated; however, many women have mild malnutrition or may be at risk of malnutrition. The mean BMI of 21.1 is lower than that found in China among women of reproductive age (21.2 - 21.7).[10]

Iodine deficiency is a serious health problem among women as indicated by the high prevalence of goiter. Nonetheless, the prevalence of goiter derived from this survey may be underestimated. Although women were examined by physicians, these survey workers did not receive extensive training in examination for goiter and may have missed milder degrees of thyroid enlargement. Iodation of salt used in Badghis Province would be difficult because most is in rock salt form and obtained from deposits in western Afghanistan by small harvesters and vendors.

Many women reported nightblindness. Although a specific word exists in the Dari language for this condition, some survey interviews were conducted in other languages, including Pushto and Uzbek. It is not known whether the identification of nightblindness during these interviews was also based on a widely known local term.

V. Mortality

The estimated crude mortality rate from this survey is somewhat elevated above 0.5 deaths per 10,000 per day, the widely accepted background rate in less-developed countries with young populations. However, it does not exceed the emergency threshold of 1.0.

The mortality rate for children less than 5 years of age is substantially elevated above the background rate of 1 death per 10,000 per day. Moreover, the estimated rate is almost statistically significantly greater than the widely accepted threshold defining an emergency situation (2.0 deaths per 10,000 children less than 5 years of age per day).

These rates demonstrate that the population of Badghis Province is in a condition of generally poor health. The predominant causes of death are preventable and treatable communicable diseases.

RECOMMENDATIONS

I. Children

1) In those areas judged to have substantial food insecurity, a regular supply of adequate food should be ensured. Food self-sufficiency should be encouraged in all communities in Badghis Province. Single blanket distributions of food probably have little impact on nutritional status and should be discouraged.
2) If specific programs are implemented to address the nutritional status of children less than 5 years of age, they should also target the mothers of identified children.
3) A further investigation should be done of the prevalence, severity, and causes of anemia in children. This investigation should include measurement of hemoglobin concentration in a representative sample of children. Because iron deficiency is the most likely cause of anemia in Badghis Province, all health facilities should stock iron supplementation tablets or capsules for oral administration to those children with identified anemia and those at risk of developing anemia. No specific interventions, such as routine deworming or use of bednets, should be implemented before the specific causes of anemia among children in Badghis Province are further understood.
4) All wheat flour distributed to the population in Badghis Province, either in general distribution, supplemental feeding programs, food-for-work programs, or other programs, should be fortified with iron to international standards.
5) An investigation of vitamin A status of children less than 5 years of age should include measurement of serum retinol concentration or other appropriate laboratory test. Routine vitamin A supplementation should be encouraged in the meantime.
6) Reported increases in the number of cases of scurvy should be promptly investigated. Consideration should be given to supplying all health facilities with vitamin C tablets for treatment of scurvy cases and prevention of scurvy in those persons felt to be at risk.
7) The level of rickets may not warrant aggressive intervention.
8) In the long term, health education should be provided to prospective or new mothers to encourage the earlier introduction of quality complementary food to infants.
9) Post-natal health services should be made accessible to mothers and newborns.
10) A mass measles vaccination campaign should be repeated in Badghis Province as soon as possible. This campaign should also include vitamin A distribution for children less than 5 years of age.

II. Women

1) The iodine intake of women of reproductive age should be increased. Iodization or iodation of the salt used in Badghis households will be difficult; however, other methods for increasing dietary iodine should be explored, including iodine fortification of edible

oil. Large producers of salt in Afghanistan and countries from which salt is imported into Afghanistan should be encouraged to fortify their product.

2) The prevalence, level, and causes of anemia in women should be investigated further. Such an investigation should include the measurement of hemoglobin concentration in a population-based sample of women of reproductive age.
3) The prevalence of vitamin A deficiency in women should be investigated further. Such an investigation should include serum testing for retinol levels or other appropriate laboratory testing.
4) All edible oil distributed as emergency relief in Badghis should be fortified with retinol to international standards.

III. General

1) The causes of mortality, and presumably morbidity, should be addressed by prevention and treatment. Water and sanitation are inadequate in the majority of Badghis households and should be improved as rapidly as possible. In addition, adequate preventive and curative health services should be available and accessible to the population of Badghis Province.
2) Training of Ministry of Public Health personnel in all aspects of nutrition and nutrition interventions should be given a priority. A country-wide policy regarding nutrition monitoring and micronutrient fortification and supplementation should be developed and implemented in all provinces of Afghanistan.
3) The protocol, data collection forms, data analysis program, and other materials used in the Badghis survey should be used or adapted for nutrition and health assessment surveys in other provinces and districts in Afghanistan as soon as possible.

Table 1. Summary of major findings in the Badghis nutrition survey

Indicator		Value
<u>Household Characteristics</u>		
Percent of households using safe water source		5.2%
Percent of households using iodated salt		2.4%
<u>Child Nutrition and Health (<5 years of age)</u>		
Prevalence of acute malnutrition	0-11 months	4.6%
	12-23 months	16.0%
	24-59 months	3.3%
	All ages	6.5%
Prevalence of chronic malnutrition	0-11 months	26.7%
	12-23 months	59.5%
	24-59 months	64.9%
	All ages	57.5%
Prevalence of signs of vitamin deficiency	Vitamin A	2.6%
	Vitamin C	3.1%
	Vitamin D	3.5%
	Riboflavin	8.5%
WHO breastfeeding indicators		
	Exclusive breastfeeding	95%
	Predominant breastfeeding	100%
	Timely complementary breastfeeding	21%
	Continued breastfeeding – 1 year	96%
	Continued breastfeeding – 2 years	52%
	Bottle feeding	7%
Cumulative incidence of diarrhea in prior 2 weeks		29.8%
Cumulative incidence of acute respiratory infection in the prior 2 weeks		33.8%
% recently vaccinated against measles		59.4%
% ever vaccinated against TB		13.5%

REFERENCES

1. WHO: World Health report. . Geneva, Switzerland: World Health Organization, 2000.
2. Richards T, Little R: Afghanistan needs security to rebuild its health services. British Medical Journal 2002; 324: 318.
3. Assefa F, Jabarkhil M, Salama P, Spiegel P: Malnutrition and mortality in Kohistan District, Afghanistan, April 2001. JAMA 2001; 286: 2723-2728.
4. Myatt m, Desplats G, Collins S: Nutritional anthropometry, health, food security, and agriculture assessment: Concern programme areas, northeast Afghanistan. : Valid International, 2001.
5. Afghanistan MICS2 Steering Committee: 2000 Afghanistan Multiple Indicator Cluster Survey (MICS2). . Islamabad, Pakistan: UNICEF, 2001.
6. Anker M, Black R, Coldham C, et al.: A standard verbal autopsy method for investigating causes of death in infants and children. , vol WHO/CDS/CSR/ISR/99.4. Geneva, Switzerland: WHO, 1999.
7. WHO: Physical Status: the Use and Interpretation of Anthropometry, Report of a WHO Expert Committee., Vol. 254. Geneva: World Health Organisation, 1995 WHO Technical Report Series).
8. Shetty P, James W: Body mass index: a measure of chronic energy deficiency in adults. Food and Nutrition Paper No. 56. Rome: Food and Agriculture Organization of the United Nations, 1994.
9. Woodruff BA, Blanck H, Duffield A, et al.: Prevalence of low body mass index and specific micronutrient deficiencies in adolescents 10-19 years of age in Bhutanese refugee camps, Nepal, October 1999. . Atlanta, Georgia USA: U.S. Centers for Disease Control and Prevention, United Nations ACC/Sub-Committee on Nutrition, U.N. High Commissioner for Refugees, Save the Children - U.K., and World Food Programme, 1999.
10. Ge Kea: The body mass index of Chinese adults in the 1980s. European journal of clinical nutrition 1994; 48(Suppl. 3): S148-S154.

ANNEX 6.

Population Nutritional Status During Famine

Michael H. N. Golden and Yvonne Grellety
Pollgorm, Ardbane, Downings, Letterkenny, Co Donegal, Ireland
and
Department of Medicine & Therapeutics
University of Aberdeen
Foresterhill
Aberdeen AB25 2ZD
Scotland

CONTRIBUTIONS

Michael Golden formulated the hypotheses, analysed the data and wrote the paper. Yvonne Grellety was responsible for organising and conducting the majority the surveys and helped interpret the data.

ACKNOWLEGMENTS

We particularly thank Anne-Sophie Fournier (Action Against Hunger, USA), Rory McBurney (Action Against Hunger, UK), Annalies Burrel (Concern International), Saskia Van der Kam (MSF) and Pierre Nabeth (Epicentre) for their continued interest in our work and their generosity in making the data from surveys that they had conducted freely available. We would also like to acknowlege the contribution of all the nutritionists, nurses and local staff in the field, in each of the countries where these surveys were carried out, for the dedicated way in which they collected the data usually in hazardous, arduous and disturbing circumstances. Our statistical scrutiny, in ways which the collectors did not envisage, shows that the data were collected by these agencies with remarkably accuracy.

Author for correspondence: Professor Michael Golden

SUMMARY

Background

We predicted that social heterogeneity would lead to changes in the shape of the distribution curve of acute malnutrition when a population is exposed to famine.

1. Methods

We analysed the body wasting of 6 to 59 month old children from 228 nutritional surveys, that had been conducted in 36 countries, in circumstances of poverty, conflict, drought or famine, by International Humanitarian Organisations. Each survey's descriptive and Kolmorgorov-Smirnov statistics of weight-for-height Z-score were computed. The number and proportion of children classified as malnourished were counted and also calculated from the mean and standard deviation.

2. Findings

There was no change in the spread of wasting within the population as it became more malnourished. The population distributions did not differ significantly from normal. There was a slight positive skewness and normal kurtosis with extreme malnutrition. Both skewness and kurtosis became marginally positive in overweight populations. Counting and calculating the prevalence of malnutrition gave the same result.

3. Interpretation

All the individuals within a defined population are equally affected by a famine, despite social inequality. This may be due to social cohesiveness in the sampled populations. Traditional definitions of vulnerability and strategies that aim to target preventive relief may be inappropriately applied in the circumstances of these populations. Calculation from the mean and standard deviation could give a more rapid, efficient and precise estimate of the extent of malnutrition than counting affected individuals.

Introduction

Intuitively, when a population is exposed to famine, children from families with few resources or entitlements quickly become emaciated whereas other families are more able to cope and the wealthy protect their children from starvation. Many studies have sought to identify the most sensitive and specific characteristics of such vulnerability, usually based upon comparisons between families with and without malnourished children. In general, these confirm common experience from all communities. Factors such as a high child to adult ratio, single parent families, lack of parental education, marketable skills, land and other assets, poor housing, water and sanitation, and social disruption are more common in families of the malnourished. In conflict situations, other factors have also to be considered such as displacement, host community attitudes, ethnicity, psychological resilience and "usefulness" to belligerents.

International agencies use such determinants of food-security to target, and thereby restrict, relief to the most vulnerable.

As food becomes scarce, a rising proportion of income is spent on food, entitlements are cashed and assets sold. As a society becomes ever more severely stressed, heterogeneity in vulnerability should be translated into an increase in the heterogeneity of actual acute wasting and, consequently, to a widening of the population distribution of wasting. That is, the better off should loose less weight than the worse off and the spread of weights-for-height within the population, as a measure of wasting, should increase. In statistical terms there should be an increase in the population standard deviation of the measures of acute malnutrition. Such "spreading out" may also lead to the population distribution developing long tails; the degree to which this occurs is measured statistically by the moment of kurtosis of the population (with a positive kurtosis the shoulders of the curve move into the tails to give a "Mexican hat" shape, whereas, a negative kurtosis is "pudding" shaped with short tails). Depending upon the relative proportions of highly vulnerable, normal and relatively protected individuals in the population, the distribution may also become asymmetric with one side of the distribution more spread than the other; this is estimated statistically from the moment of skewness. Where most people lose weight, with a few protected, the skew will be positive and where most people cope well but there is small highly vulnerable group the skew will be negative.

As mortality risk rises exponentially with the degree of malnutrition (see Pelletier review), when a substantial proportion of the population is affected, the mortality rate may rise to a level that will affect the population distribution; we would predict a positive skewness when the lower tail of the distribution is lost through death. At a very advanced stage of famine the wide standard deviation may then change to become narrow as the individuals remaining alive in the population bunch towards the lower limits of biological adaptation. The standard deviation, kurtosis and skewness may also be affected if the more able can migrate from the stricken area. Such migration would tend to remove the upper tail of the distribution.

In this study we set out to test whether these predicted changes in the shape of the population distribution of acute malnutrition actually occur as populations are exposed to starvation and famine secondary to complex political emergencies, drought or severe poverty.

Methods

The raw data from nutritional surveys that had been conducted for the purposes of assessing the prevalence of acute malnutrition in deprived and starving populations were obtained from the non-governmental organisations, Medicine Sans Frontière, Action Contra le Faim and Concern International. 228 surveys were included in the study. They were conducted in 36 different countries in Africa (22), Asia (7), Europe (5) and Latin America (2) from 1987 to 1999. The mean number of subjects per survey was 628 (±300). Table 1 shows the regions, countries and numbers of children that were included in this analysis.

Survey methodology

Each of the surveys was a two stage cluster survey of children aged from 6 to 59 months of age. In this method 30 clusters are selected at random from a map of the region. In each cluster the first child is selected at random and subsequent children according to the spatial relationship of their house to the last house visited. The number of children for each cluster is calculated according to the expected prevalence of malnutrition in the community. Each survey included, *inter alia*, the children's gender, age, weight and length, for individuals below 85cm, or height for those over 85cm.

The raw data had been entered into Epi-info in the field during the initial survey; they were analysed by the Epi-nut program and used for a contemporary report on the nutritional situation and to mobilise resources, plan relief operations or monitor their effectiveness.

The degree of wasting was calculated as the weight of each child in relation to the weight of a normal child of the same gender and stature using the NCHS standards. The deficit in weight was expressed as multiples of the standard deviation of the NCHS population. This is referred to as the "Z-score" of weight-for-height. When expressed in this way a population that is exactly the same as the standard NCHS population will have a mean Z-score of zero with a standard deviation of one Z-score unit.

In each survey, children with a weight-for-height which was more than 4 z-scores above or below the survey's mean were excluded from the analysis on the basis that their weight or height were incorrectly measured or recorded, or that they did not properly belong to the population being surveyed. Of the original 143,535 children in the 228 surveys, 297 (0.2%) were thus excluded from the analysis leaving a total of 143,238 children.

For each survey the mean, standard deviation and moments of kurtosis (g2) and skewness (g1) of the weight-for-height Z-scores were calculated. In order to examine the degree of deviation from normality the Kolmorgorov-Smirnov statistic was calculated, after standardisation. In this procedure the subjects are sorted and each individual value compared to the value it would have if the population distribution was entirely normal (Gaussian). The Kolmorgorov-Smirnov statistic is the size of the individual observed value that deviates most from the expected value. The units of this "maximum difference" are in standard normal deviates. Systat statistical package was used for computation.

Moderate wasting was defined as a weight-for-height of less than -2 Z score units and severe wasting as a weight-for-height of less than -3 Z score units.

The observed number of children in each survey who were moderately and/or severely wasted were counted. The number of wasted children that would be expected to occur in the sample, if the weights-for-height of the population were normally distributed, was calculated from the normal density function (ZDF_x). The equation ***ZDF_x [(cutoff - mean)/SD]*** was used, where "cutoff" is <-2Z score for moderate & severe and <-3Z score for severe wasting, and mean and SD are the mean and standard deviations of the weight-for-height Z-score. The expected number of wasted children in the survey was then calculated from the sample size.

The sum of the square of the difference between the observed (O) and expected (E) number of wasted children in each survey, as a function of the expected number, that is $\Sigma(O\text{-}E)^2/E$, follows the χ^2 distribution with n-1 degrees of freedom. The statistic will have a probability of $p< 0.05$ if, overall, the observed and expected counts differ significantly; this will occur if the distributions are not normal, in which case the two methods of estimating the true population prevalence from the sample will give different results. Where the expected number of malnourished children is less than 5 inclusion in the sum gives spurious results. Used in this way, the χ^2 statistic specifically examines the lower tail of the distribution at precisely the cutoff points used to define moderate and severe wasting and tests whether knowledge of the sample mean and standard deviation alone can be used to estimate the proportion of moderately and severely wasted children from a population sample.

To examine each survey individually, the same observed and expected numbers were expressed as proportions of the sample population and compared using a procedure for the comparison of two proportions (Armitage 1994). The expected (p_e) as well as the observed proportions (p_o) are both estimates of the true proportion of wasted children in the population; the best estimate of this proportion is thus the pooled proportion (p_p); with variance $(p_o\text{-}p_e) = p_p(1\text{-}p_p)(2 * 1/n)$, where n is the sample size. We tested the null hypothesis that both samples measured the same population in each survey by taking

$$Z= (p_o\text{-}p_e)/\sqrt{[p_p(1\text{-}p_p)(2 * 1/n)]}$$

That is the difference in the two estimates of the proportion of wasted children divided by the square root of the variance. This will be greater than 1.96 if the two methods of obtaining the proportions of malnourished children differ significantly at the 0.05 level (two tailed).

Results

The means of the weights-for-height from the surveys included in this study ranged from the relatively overweight in the Balkans to some very severely malnourished populations in Africa, where over one third of the population was wasted (table 2).

As populations become more wasted the mean weight-for-height falls. However, as famine supervened there was neither an increase, nor a decrease, in the spread within each population. With extreme malnutrition there was no evidence that the remaining children "bunched" at the lower limits of survival. Linear (and higher degree polynomial) regression of the standard deviation against the survey mean was almost flat (figure 1). The 228 standard deviations were themselves normally distributed with a mean slightly less than the NCHS standard (0.98, 95% CI 0.97-0.99). The spread of the standard deviations of weight-for-height around the NCHS standard population was small; ranging from 0.8 to 1.2 in 95% of the surveys.

Distributions are usually considered to differ little from a normal Gaussian distribution if the moments of kurtosis and skewness are within plus or minus one unit. The moments of kurtosis of the surveys were within these limits in over 90% of the surveys. However, contrary to expectation, the populations where wasting was very common had a normal kurtosis (figure 2) and as the population mean weight-for-height increased the distribution developed a positive kurtosis.

None of the surveys were sufficiently skewed to deviate significantly from normal and there was not a linear relationship between skewness and weight-for-height ($r=0.12$). However, there was a significant curvilinear correlation between the degree of skewness and the mean weight-for-height of the population. As the populations became either very wasted or overweight a slight positive skewness developed ($r=0.33$, $p<0.001$) (figure 3). Such a skew will occur where either the upper tail is prolonged or the lower tail truncated. It should be emphasised, however, that such degrees of skewness are relatively trivial and are insufficient to cause a difference in the computed and measured proportion of wasting in a survey population.

Our data show that as a population becomes very malnourished, although the distribution develops a positive skew, the kurtosis approximates zero; in this case the asymmetry develops because of losses from the lower end of the distribution. In contrast, as wasting disappears and the population becomes overweight the positive skewness is associated with an increasing kurtosis; here, a higher proportion of the population than expected are obese and found in the upper tail of the distribution.

Of the 228 surveys the Kolmorgorov-Smirnov statistic was not significantly different from Gaussian normality in 225. Three surveys differed statistically from normal (Buchanan, Liberia: 1996, mean WHZ -1.76 ± 0.91, KS-maxdiff = 0.082, $p<0.01$; Labone, South Sudan: 1996, mean WHZ $- 1.52 \pm 0.99$, KS-maxdiff = 0.051, $p<0.05$; Nimule, South Sudan: 1997, mean WHZ $- 1.64 \pm 0.83$, KS-Maxdiff = 0.054, $p=0.01$). Other surveys, which were conducted in the same locations, were included in the database and these did not differ from normal; however, the other surveys were conducted at times when the wasting within the population was not so severe. When the Kolmorgorov-Smirnov maximum-difference was plotted against the survey mean weight-for-height there was a significant curvilinear relationship similar to that illustrated for the moment of skewness (Maxdiff (KS) = $0.011whz^2 + 0.014whz + 0.036$, $r=0.313$, $P<0.001$). This both confirms that the surveys deviated more from normality as the population became extremely malnourished or overweight and also that this deviation was insufficiently great, within the range of population wasting we have examined, to cause 99% of the curves to differ significantly from normality.

Typical normal probability plots, chosen to illustrate differing degrees of starvation, are shown in figure 4. With this presentation, if the population is normally distributed all the points lie on a straight line. The deviation from this line is what is measured in the Kolmorgorov-Smirnov statistic. For the surveys where the populations were wasted the maximum deviations from the line invariably occurred in the tails of the distribution where values derived from erroneous measurements are more likely to occur. The deviations where the mean weight-for-height was more than zero also appeared to deviate from linearity in the body of the distribution (see Bosnia and Croatia, Figure 4), although this was not significant using the Kolmorgorov-Smirnov test.

The cumulative distribution of the maximum deviations from normality is shown in figure 5. The deviation from normal was less than 0.05 standard-normal-deviates in 90% of the surveys included in this analysis. The surveys whose individual data are shown in figure 4 are marked in fig 5; the surveys illustrated cover the spectrum of the deviations from normal observed.

There were 15 089 moderately or severely wasted children observed in the 228 surveys. The corresponding number calculated from the means and standard deviations was 15 343. Overall, the differences between the observed and expected number of wasted children, in each survey, was not significant (χ^2 =184, df=227, p=0.98).

The observed and expected number of children with severe wasting were 2 132 and 2 153, a discrepancy of 21 children (1.0%). In 115 of the surveys more than 5 severely malnourished children were expected to occur, there was no significant difference in the observed and expected number found in these surveys (χ^2 =133, df=114, p=0.10).

When the difference between the observed and expected proportion of children with wasting were examined for each survey individually only 2 of the 228 surveys were significant for moderate wasting (Ruvuma, Burundi, 1995 $p<0.05$ and Buchanan, Liberia, 1996, $p <0.01$) and two for severe wasting (Kabul, Afghanistan, 1995, $p<0.05$; Nimule, South Sudan, 1997, $P<0.05$). Each survey where the observed and expected proportions were significantly different at one of the cut-off points was not significantly different when the other cut-off point was considered.

Discussion

We have shown that as a population undergoes starvation there is not an increase in the heterogeneity of wasting within that population. The prior hypothesis was incorrect. Therefore our result calls into question the basic assumption upon which the hypothesis was based; that some members of the population are more vulnerable to wasting and will become quickly emaciated while others are relatively protected. It would appear that, on average, exactly the same absolute quantity of weight is lost by a child in the upper, as in the lower, portions of the distribution. This is counter-intuitive. In is unclear why the results of studies which show clear differences between families of the malnourished and well nourished are not translated into changes at the population level. In general, where these studies have been conducted, the prevalence of wasting has not been high and frequently the cases have been ascertained from health facilities. What characterises a malnourished child's family under stable circumstances may be different from those of a nutritional emergency or when a large proportion of the population is affected.

It seems as if a person who started with the poverty that sustained a weight-for-height of, say, 0 Z-score, will during the privation have a food availability that sustains a weight-for-height of -1 Zscore, whilst the person who started with this degree of food availability has now fallen to a level that only sustains a weight-for-height of -2 Z-score. Such a simple hypothesis is unlikely. It would necessitate a linear relationship between degrees of privation, food quality or quantity and weight-for-height of the children. The data may be affected by migration with the rich having the resources to move from the survey area, to be quantitatively balanced by the poor who die, leaving a residual population that is normally distributed; again this seems an unlikely explanation. We suggest that there are altruistic or other cohesive social networks whereby members of the community assist each other in times of stress so as to maintain their relative positions as the whole population deteriorates. Certainly people with similar poverty, and with family, ethnic or other ties, tend to live in close geographic proximity. In this case cluster sampling is likely to select 30 groups of children that are each themselves relatively homogeneous. There do not appear to be any quantitative data to address any of these hypotheses, but the real situation is likely to be very complex, and is certainly ill-understood and under-investigated. If we calculate the prevalence of wasting from the mean and standard deviation of each cluster, using the normal density function, we find that the degree of variation between clusters within a survey is much greater than the difference between surveys although each cluster's distribution appears to be Gaussian (M. Golden & Y Grellety, Unpublished). This indicates that there are indeed relatively homogeneous geographical "pockets" within which all the individuals suffer to a similar degree.

Furthermore, the phenomena appear to be reproducible from one country, region and continent to another. The surveys we have examined included such different racial groups as thin, tall pastoralists (Dinka) from Sudan, Bantu groups from central Africa, Tamils from Sri Lanka and people from Central Asia and Europe. We conclude that most communities of the world react in a similar fashion when subject to major nutritional stress.

The normality of the curve and the maintenance of a constant degree of heterogeneity within the population also calls into question the utility of attempting to identify those *individual families* who need special help to *prevent* weight loss. As the whole population has been equally affected by the famine and all individuals have lost comparable amounts of weight, our analysis suggests that preventive relief should be directed at the whole affected community, or pocket areas within the wider community, without targeting individual persons or families that are perceived as particularly vulnerable. Curative programs, on the other hand, are required for the already wasted because of their high mortality risk. However, if resources are only expended upon the wasted then one would not expect to see a substantial change in the prevalence of moderate wasting. This is because, in the dynamic of famine, the treated individuals will be replaced by mildly wasted children deteriorating because "targeting" has denied them relief. In many of the situations where the present surveys were conducted therapeutic and supplementary feeding programs were in operation. They did not appear to affect any of the parameters of the population distribution of wasting. We conclude that it is critical to ensure that the whole population receives an adequate, nutritionally balanced, ration, as the first priority.

It is often assumed that weight-for-height and the prevalence of wasting is a "trailing indicator" in a famine situation. Thus, it is postulated that there is a sequence of events that starts with the population becoming food insecure. The individuals within the population then exercise various coping strategies that ameliorates their condition and prevents anthropometric change; it is only when the coping strategies cannot compensate for the shortfall and fail that anthropometric change starts to occur; as the situation further deteriorates individuals become severely malnourished. This linear sequence may well be the case for individual families, but our results indicate that such a strict temporal sequence, whereby food security indicator deterioration always come well in advance of anthropometric change may not be the case at a population level. As individual families and "pocket areas" go through such a sequence starting at different times and progressing at different rates, from the perspective of the whole population there may be a closely associated steady deterioration in the mean weight-for-height (and consequently the prevalence of those falling below a certain threshold). Longitudinal data with sufficient temporal precision to address this relationship has not been collected.

Our results indicate that with extreme starvation there is some loss from the lower tail of the distribution giving slight skew to the distribution. However, this is much less pronounced than anticipated, and is sufficiently subtle not to render the curves significantly non-normal. The moments of skewness and kurtosis are disproportionately affected by relatively few individuals in the tails of the distributions, where errors of measurement are likely to occur. The pattern in our data only emerges when a sufficiently large number of surveys with a spread of nutritional status are considered; with present survey methodology, the variability is such that it would be unsafe to interpret slight deviations from normality, in individual surveys, in relationship to the particular circumstances of the population.

Surprisingly, the wasted populations approximate normality more closely than the normally nourished populations. Kurtosis reaches zero at -1.5 Z score weight-for-height, when 31% of the population are wasted, and skewness approaches zero most closely at -0.44Z when 6% of the population at wasted. These data differs from the North American population from which the standards are derived. The standard USA population had a positive skew. To circumvent this difficulty different “normal standard deviations” are used as divisors to derive positive and negative Z-score values. Indeed, in overweight populations there is usually a positive skew, particularly in adults but also children. The Croatian survey shown in fig 4 also appeared to be skewed in this way, although its small size made this not significant. It would appear that the effects of abundant energy dense food availability are different from a deprivation of food. Our results, derived from so many different populations, also call into question the validity of deriving standards of weight-for-height from a population that is not normally distributed, particularly an affluent population where bottle feeding and obesity are common. The standards may be more globally applicable if they were assumed to be symmetrically distributed, using the lower portion of the curve and eliminating the obese from the reference. The same divisor would then be used to derive Z-scores above and below the median. Such a change would have a small effect of making more children in affluent countries overweight without altering the prevalence of wasting.

Nutritional surveys are critical tools to assess and monitor an emergency situation. They, with mortality surveys, are the principle data used to persuade donors, International Agencies and non-governmental organisations to commit effort and funds for relief. Such surveys are also used to determine the magnitude and the type of response that has to be planned and implemented. The accuracy of the methods and the confidence of donors and planners are therefore critical. When the original survey methodology was being devised, appropriately, no assumptions was made about the nature of the distribution of wasting within the population. Therefore, sufficient children had to be sampled to allow the proportion who were malnourished to be directly counted. Even with a sample of 900, if the true prevalence of moderate malnutrition is 10% and severe malnutrition 1%, then, on average, only 9 severely wasted children will found in the survey. Because of the relatively small number of individuals observed, the confidence interval around this number is large. If the affected population has

35,000 children then relatively expensive therapeutic facilities will need to be provided for up to 350 severely malnourished children, a number that would overwhelm the normal health facilities, and there will be about 3150 moderately malnourished children who will need supplementary feeding. This effort requires considerable human and material resources to be mobilised, planning, logistic support and time to implement. Any error in the survey could have a considerable impact on whether the response is appropriate.

For this reason relatively large amounts of time, effort and funds are committed to nutritional surveys. They are frequently conducted under hazardous conditions where the staff collecting the data are in personal danger. To avoid a long delay before the results are available many teams of field workers are recruited, trained and then all staff are committed to intensive data collection for the duration of the survey, to the exclusion of their other pressing duties. Surveys are not repeated frequently enough to assess how the nutritional status of a population is changing over short periods of time. There are few experienced staff available in such situations to go with each of the teams and the training is often rushed. The quality of the data collected may then be questioned by donors and others. This leads to equivocation before committing the massive sums of money involved in relief – a delay which often costs many lives.

Both statistical methods of comparison of the estimates of the true population of malnutrition (counts and proportions) show that the estimation of the population prevalence of wasted and severely wasted children by calculation from the mean and standard deviation gives the same result as that obtained when the wasted children are individually found and counted. Indeed, the deviations from normality that we observed in a few of the surveys are more likely to be due to methodological errors when teams of observers are quickly recruited, trained and urgently sent into hazardous situations to collect the data, than true deviations.

If the actual weight-for-height information from every child in the population sampled is used, instead of only the dichotomous position of the child with respect to the cut off point, then far fewer children are required to make an estimate of the prevalence of moderate and severe malnutrition. Indeed, there need not be any severely malnourished children included in a survey for an accurate estimate of prevalence to be made. Errors of measurement or recording, that invariably occur, are most likely to be found in the tail of the distribution and will have a much greater effect upon the estimate of the population prevalence by direct counting than by calculation from the mean and standard deviation. It is likely therefor that calculating prevalence gives a more accurate estimate of the true population prevalence than that obtained from counting.

If the same degree of precision is obtained with far fewer subjects there will be major advantages. The data could be obtained and analysed more quickly, and the staff put at less physical risk collecting data. Fewer staff would be diverted from other pressing relief work. The data could be collected by one team which would become highly trained and experienced and produce data with less error. With the same expenditure, the survey team could be employed permanently during the crisis to repeat surveys at frequent intervals and give a clearer view of the evolution of the famine and the adequacy of the humanitarian response.

In none of the surveys that we examined were there sub-populations that differed markedly in nutritional state. If a survey is observed to differ significantly from normality or have a large standard deviation, then we suggest that either two distinctly different populations may have been included in the sample or there is methodological error. All surveys should be checked for normality and any difference investigated; for example, such differences could occur with discrimination against minorities or between displaced and resident populations.

We would emphasise that we have not considered oedematous malnutrition, another form of acute malnutrition that occurs in famine and must be sought. There is a danger that if sample size is reduced this problem may be overlooked entirely. We have also only examined wasting which can change relatively rapidly with disease and the availability and quality of food; stunting in height, which is caused by longstanding malnutrition may show a different pattern.

Table 1. Surveys analysed

Region	Country	surveys	total children
Africa: Central	Burundi	9	5 095
	Central African Republic	1	443
	Congo	5	3 817
	Kenya	2	570
	Rwanda	13	7 168
	Tanzania	10	7 021
	Uganda	9	5 363
Africa: Sahel	Ethiopia	2	1 583
	Somalia	13	6 274
	Sudan	15	10 187
	Tchad	9	7 042
Africa: Southern	Angola	5	2 938
	Madagasgar	3	1 942
	Malawi	24	9 375
	Mozambique	7	1 861
	Zambia	1	504
	Zimbabwe	3	1 361
Africa: West	Cote d'Ivoire	2	1 377
	Liberia	26	23 229
	Mauritania	2	2 182
	Sierra Leone	19	14 685
Latin America	Haiti	8	5 829
	Nicaragua	3	1 544
Asia	Armenia	1	263
	Afghanistan	4	4 094
	Bangladesh	2	935
	Mongolia	2	1 138
	Philippines	1	630
	Sri Lanka	2	1 822
	Tajikistan	4	3 592
Europe	Albania	1	904
	Bosnia	10	3 196
	Croatia	8	3 458
	Kosova	1	920
	Macedonia	1	896
	total	228	143 238

Table 2 Summary of distributional parameters derived from 228 nutritional surveys

Statistic		Mean	± sd	2.5 & 97.5 centile		Normality*
mean	Z score	-0.63	± 0.48	-1.56	+0.36	NS
standard deviation	Z score	0.98	± 0.08	0.83	1.15	NS
Maximum	Z score	2.7	± 0.6	+1.2	+4.1	NS
Minimum	Z score	-3.7	± 0.5	-4.7	-2.4	<0.01
Moment of kurtosis		0.31	± 0.39	-0.36	+1.18	NS
Moment of skewness		0.09	± 0.20	-0.27	+0.52	NS
Kolmorgov-Smirnov statistic	SND**	0.034	± 0.013	0.018	0.059	<0.005
moderate and severe wasting	%	10.1	± 9.0	0.8	33.5	<0.001
moderate wasting (<-2 Z WH)	%	8.6	± 7.2	0.7	28.6	<0.001
severe wasting (<-3 Z WH)	%	1.5	± 0.2	0.0	6.9	<0.001

* The normality of distribution of the parameters was assessed with the Kolmorgov-Smirnov test. NS = not significantly different from a normal distribution.

** SND = Standard Normal Deviates.

WH = weight-for-height

Legends to Figures

Figure 1. The relationship between the sample mean and standard deviation of weight-for-height Z-score for children aged 6 to 59 months in 228 nutritional surveys. The relationship is not significant (r=0.02).

Figure 2. The change in moment of Kurtosis of weight-for-height distributions in surveys of children aged 6-59 months as the population becomes progressively more wasted.
Kurtosis = 0.33whz + 0.05; r=0.41, p<0.001.

Figure 3. The change in the moment of Skewness in weight-for-height distributions in 228 surveys of children aged 6-59 months as the population becomes progressively more wasted.
Skewness = 0.17whz2 + 0.15whz + 0.08; r=0.33 p < 0.001

Figure 4. Normal probability plots of weight-for-height z-scores of individual subjects from illustrative surveys with different degrees of wasting within the population.
In order from most to least wasted - Mozambique 1992, n=168 maxdiff 0.051; Kenya 1992, n=428, maxdiff 0.024; Ethiopia 1995, n=793, maxdiff = 0.030; Rwanda 1994, n=887, maxdiff = 0.024; Uganda 1998, n = 951, maxdiff = 0.020; Nicaragua 1997, n=528, maxdiff = 0.035; Bosnia 1993, n=452, maxdiff = 0.046; Croatia 1990, n=445, maxdiff = 0.055.
maxdiff = maximum difference from normality with the Kolmorgorov-Smirnov procedure.

Figure 5. The maximum deviation of individual data points from a normal (Gaussian) distribution, determined by the Kolmorgorov-Smirnov procedure, in 228 nutritional surveys carried out in emergency situations. SND = Standard Normal Deviate. The 8 surveys illustrated in figure 4 are marked with a larger square symbol.

Figure 1. The relationship between the sample mean and standard deviation of weight-for-height Z-score for children aged 6 to 59 months in 228 nutritional surveys. The relationship is not significant (r=0.02).

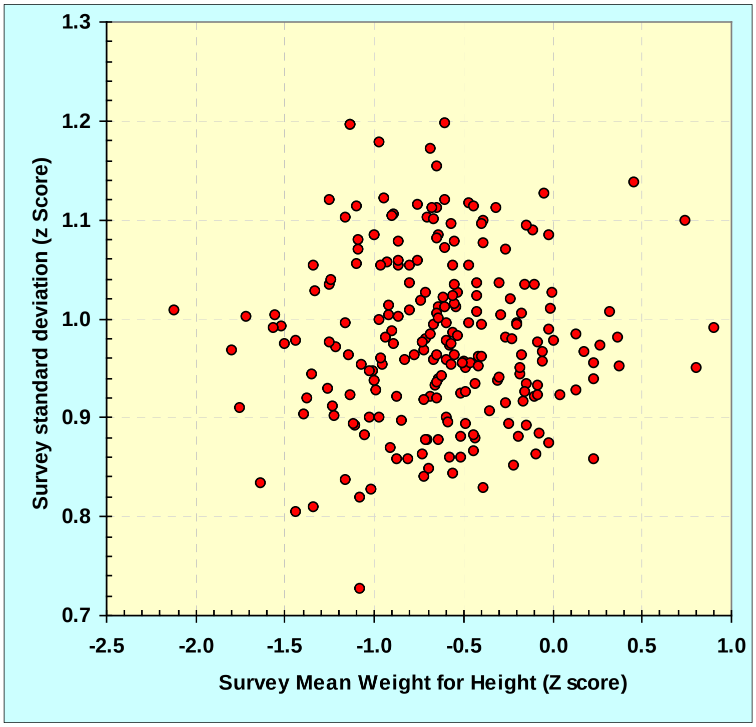


Figure 2. The change in moment of Kurtosis of weight-for-height distributions in surveys of children aged 6-59 months as the population becomes progressively more wasted.
Kurtosis = 0.33whz + 0.05; r=0.41, p<0.001.

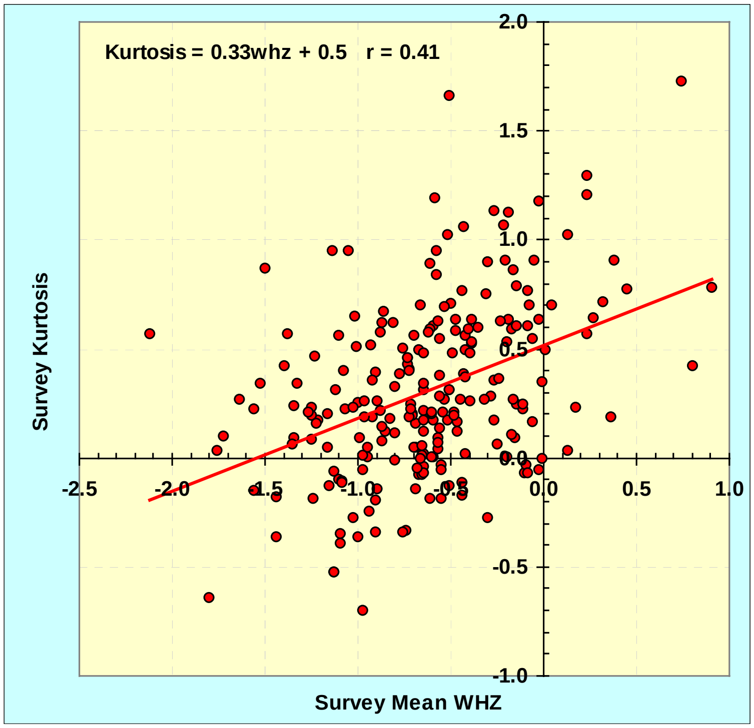


Figure 3. The change in the moment of Skewness in weight-for-height distributions in 228 surveys of children aged 6-59 months as the population becomes progressively more wasted. Skewness = 0.17whz2 + 0.15whz + 0.08; r=0.33 p < 0.001

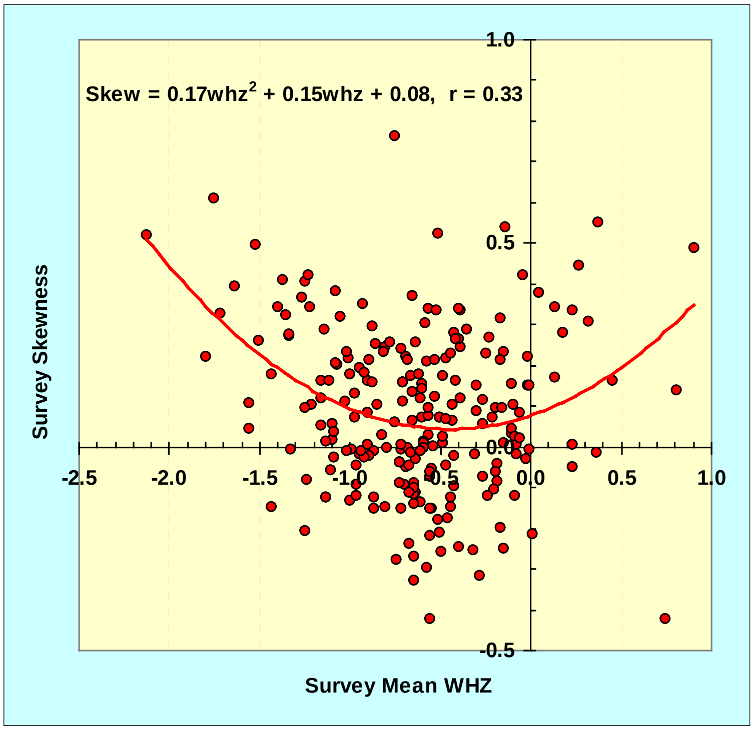


Figure 4. Normal probability plots of weight-for-height z-scores of individual subjects from illustrative surveys with different degrees of wasting within the population.
In order from most to least wasted - Mozambique 1992, n=168 maxdiff 0.051; Kenya 1992, n=428, maxdiff 0.024; Ethiopia 1995, n=793, maxdiff = 0.030; Rwanda 1994, n=887, maxdiff = 0.024; Uganda 1998, n = 951, maxdiff = 0.020; Nicaragua 1997, n=528, maxdiff = 0.035; Bosnia 1993, n=452, maxdiff = 0.046; Croatia 1990, n=445, maxdiff = 0.055.
maxdiff = maximum difference from normality with the Kolmorgorov-Smirnov procedure.

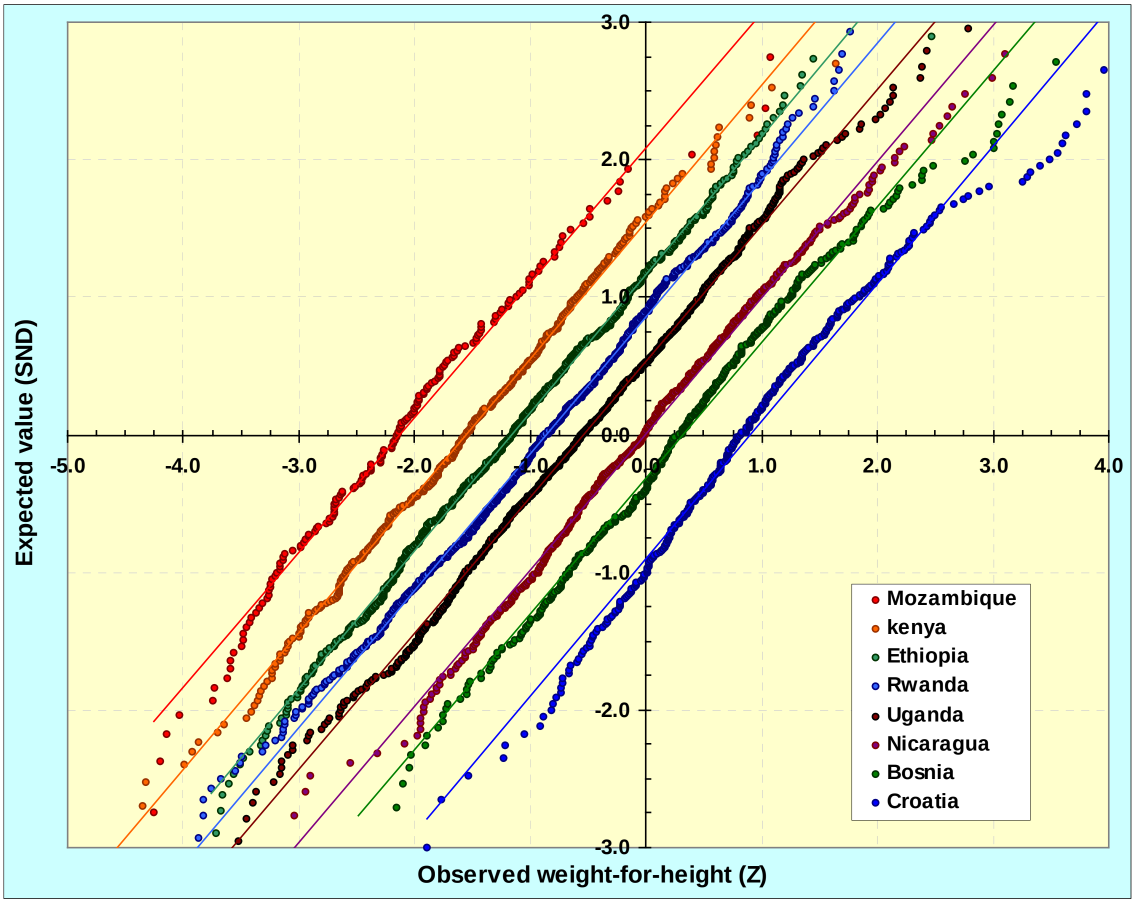
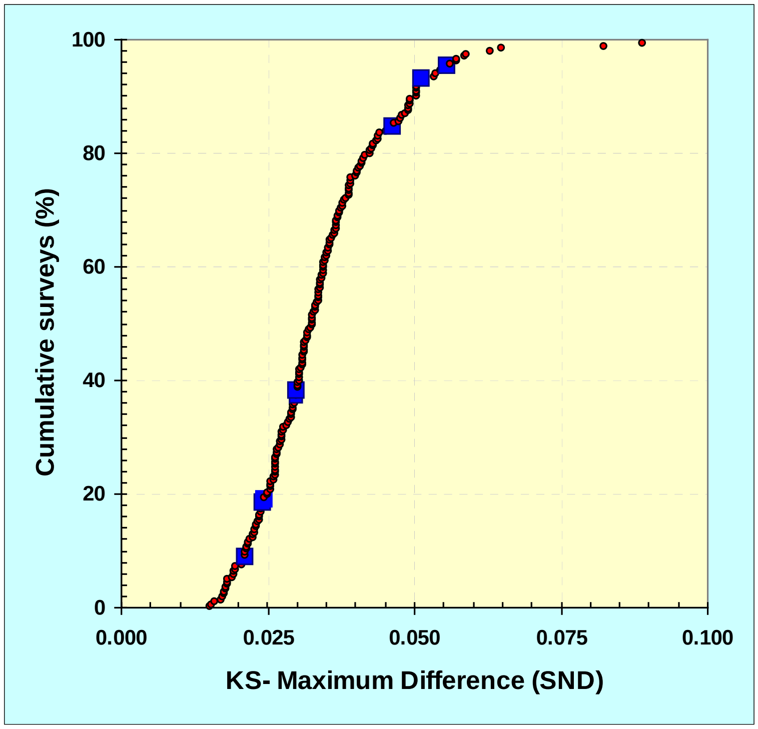


Figure 5. The maximum deviation of individual data points from a normal (Gaussian) distribution, determined by the Kolmorgorov-Smirnov procedure, in 228 nutritional surveys carried out in emergency situations. SND = Standard Normal Deviate. The 8 surveys illustrated in figure 4 are marked with a larger square symbol.



Annex 7.

Survey Manual: Emergency Nutrition Surveys, Afghanistan, 2002

Introduction

This package contains most of the some computer files you may useful when conducting a survey evaluating 1) the nutritional status of children less than 5 years of age, 2) the nutritional status of women of reproductive age (15 – 49 years), 3) the recent rate and causes of mortality, 4) the reproductive health of women of reproductive age, 5) child and infant breastfeeding practices, 6) micronutrient status of children less than 5 years of age, and 7) mictronutrient status of women of reproductive age. These materials were used in carrying out a survey in Badghis Province in March 2002. Distribution of this package of files has two objectives:

1) To make assessment surveys easier for organizations working in Afghanistan who wish to carry out such surveys.
2) To assist in the standardization of the types of data collected and the method by which data are collected. Standardization will then make surveys in different areas of Afghanistan more comparable, allowing more complete assessment of nutrition and health.

Of course, organizations working in different areas may encounter different situations. For this reason, revision and adaptation is encouraged to make these survey materials more usable to the organization conducting the survey. For example, survey managers may wish to revise the local calendar, originally developed for the western provinces, to make it more specific to their geographic area of concern. However, because one of the objectives of this package is standardization, we encourage the use, as much as possible, of these original materials. The data gathered by a survey using this package will conform to the consensus recommendations made by the Nutrition Planning Workshop held in Kabul on 11-14 February 2002. It is strongly encouraged to include in any district or province-wide survey at least the minimum data recommended by this workshop.

Many documents contained in this package are in both English and Dari. Because these materials were originally developed for a survey in Badghis Province, we have not translated anything into Pushto. Others are encouraged to undertake this task! Documents were originally written in English, then translated to Dari, then backtranslated by a different translator. Moreover, during the Badghis survey, some errors were found; these should have been corrected after the survey; however, please feel free to correct any erros which remain.

List and description of computer files in this package

This package contains the computer files listed below. As a convention, in this document the names of computer files will be in SMALL UPPER CASE to distinguish them from other text; however, when you open the ZIP file, these names will appear in normal upper and lower case. Filenames with "(ENG)" or "(DARI)" in them indicate which language that document is in.

Filenames without such a language designator are in English. A warning: you may wish to open those files in Dari on a computer equiped with arabic Windows or Microsoft Word. When I open them on my computer, they become irretrievably corrupted.
Documents created originally in Microsoft Word 2000 were converted to Rich Text Format (filenames ending in .rtf) so that they are accessable to earlier versions of Word and other word processing programs.

A) SURVEY MANUAL – READ ME 1ST.RTF – The document you are reading now
DATA COLLECTION FORM (ENG).RTF
DATA COLLECTION FORM (DARI).RTF
CLUSTER CONTROL FORM (ENG).RTF
CLUSTER CONTROL FORM (DARI).RTF
LOCAL CALENDAR (ENG).RTF
LOCAL CALENDAR (DARI).RTF
LOCAL CALENDAR – BLANK.RTF
VERBAL AUTOPSY QUESTIONS (ENG).RTF
VERBAL AUTOPSY QUESTIONS (DARI).RTF
DATA TO BE COLLECTED.RTF
RANDOM NUMBER TABLES.RTF
SUPPLIES & EQUIPMENT LIST.RTF
TRAINING SCHEDULE.RTF
ANTHROPOMETRY STANDARDIZATION FORM.RTF
DUTIES & PROCEDURES.RTF
BADGHIS REPORT.RTF
BADGHIS REPORT.PPT
DATA FILES - EMPTY.ZIP
VARIABLE NAMES IN DATA COLL FORM.RTF
NUTR.PGM
DEATH RATE CALCULATION.XLS
BREASTFEEDING ANALYSIS.XLS

Data to be collected

As mentioned above, the data to be collected by surveys using this package was agreed upon by a meeting of various ministries of the government of Afghanistan, mutiple United Nations agencies, various donors, and many non-governmental organizations (NGOs). The basic variables are listed in the document DATA TO BE COLLECTED.RTF.

Justification for and description of sampling method

Because of the general lack of population data at district, provincial, and national levels, the Badghis survey, and probably most other surveys in Afghanistan, will have to use cluster sampling methods. If each cluster is the same size, this first stage of sampling must be done probability proportional to size. That is, clusters must be selected using the method most commonly used for cluster surveys. This method is recommended by the World Health Organization (WHO) and is described in many other resources.

The second stage of sampling is a bit more controversial. We found during the Badghis survey that village leaders often had or could quickly help us construct a list of all the households currently living in each village selected to contain a cluster. We then employed a random number table to selected households from this list. For this reason, there is no need to employ the frequently used, albeit incorrect and biased, method for the second stage sampling which is recommended by the Expanded Programme on Immunization (EPI) of the WHO. The EPI method biases household selection toward the center of the village, which in many cases introduces serious bias into measures of health and nutrition. We strongly discourage its use! Moreover, it probably takes as little time to construct a household list and choose households correctly with a random number table than it does to find the center of the village, choose a direction, count the houses along this direction, and choose a starting household, as recommended in the EPI method. Moreover, truly random selection of households probably decreases the design effect introduced by cluster sampling, since the households in a single cluster are no longer adjacent to each other, but instead scattered throughout the village. This decrease in design effect can substantially increase the precision of the survey without increasing the sample size.

Our experience in the Badghis survey demonstrated that people with secondary or university training, but no training or experience in mathematics or statistics, can easily learn the sampling procedures described above and in the Badghis survey report (BADGHIS REPORT.RTF). This sampling method is described in detail in the document DUTIES & PROCEDURES.RTF, which can be given to each English-speaking team supervisor to assist him/her in the field when carrying out the second stage of sampling. Please give this method a try; you will find that it is not much more difficult, and possibly easier, than the traditional EPI method. And it is really much more correct.

Of course, if you already have a list of all the sampling units in your sampling universe, that is, if you have a list of all households which you might want to include in your survey, there is no need whatsoever for cluster sampling. Using simple or systematic random sampling, you can achieve much greater precision with the same sample size or the same precision with a much smaller sample size. For example, in Maslakh Camp outside Herat, a new registration exercise in February 2002 has made available a computerized list of all households in the camp. Each household has an address listed in the computer, and the houses in the camp are all numbered with these addresses. Therefore, it would be very easy to choose a systematic random sample from the computer, then go to each of the selected households. Do not blindly rely on cluster sampling for all your survey needs; you will be wasting valuable resources and time in some situations.

Sample size calculations

The file BADGHIS REPORT.RTF contains the report from the Badghis survey. The sample size calculations used are fully explained therein. In short, the traditional 30 x 30 nutrition cluster survey (30 children in each of 30 clusters) is sometimes not necessary and probably often wastes resources and time if survey managers do not need extreme precision.

When looking at more than one health and nutrition outcome, you must calculate the sample size needed to achieve your desired precision for each important outcome. The outcome with the largest sample size dictates the sample size for the entire survey.

Moreover, you need to distinguish between sampling units and units of analysis. For example, in the Badghis survey, we sampled households, but we wanted to collect and analyze data on children < 5 years of age. Assuming each household had, on average, 1.3 children < 5 years of age (as shown in the MICS2 survey), we selected enough households to enroll our target number of 534 children (about 18 children per cluster). The number of households necessary for the entire survey was 534 divided by 1.3 or 410 households. This comes out to only 13.5 households per cluster. However, because of the heavy emigration from Badghis Province in the past few years, we expected as many as 25% of households to be absent. We therefore selected 18 households per cluster.

We chose 30 clusters because with fewer clusters, the design effect tends to rise rapidly. More clusters is better; however, adding clusters may not provide enough additional precision to make the extra logistic efforts worthwhile. In Badghis Province, and probably most other rural areas of Afghanistan, the great distances between clusters present serious logistic constraints, making the addition of clusters beyond 30 too costly in time, money, and manpower. Of course, survey managers who do not face such constraints and who wish to further decrease the design effect (and thus increase precision) could choose more numerous, smaller clusters.

A word on whether to select only one child per selected household or include all eligible children in each selected household: if you choose to select only one child, please do so randomly. Do not select the oldest or youngest child or the child who is most readily available. Such procedures introduce serious bias into your sample of children. If you select only one child, you must record how many eligible children are in each household, and then perform a statistically weighted analysis. In such situations, the child selected in a household with more than one eligible child represents all the eligible children in that household and therefore must be given more statistical weight during data analysis. We think it is much easier to just include all eligible children in each household. The data analysis is much easier, the sample is not longer biased toward single children, and it does not substantially increase the clustering (which increase the design effect).

Training survey workers

The survey worker training for the Badghis survey took about 4 days. If you are using survey workers with some experience in surveys or anthropometric measurement, training may take less time. The training schedule used for the Badghis survey is contained in the file TRAINING SCHEDULE.RTF.

Training included practice in the use of a local calendar of events to determine children's age more precisely that initially reported by the mother. This calendar in included in the files LOCAL CALENDAR (ENG).RTF and LOCAL CALENDAR (DARI).RTF. Also included is the file LOCAL CALENDAR – BLANK.RTF. This file gives you the format of the local calendar used in Badghis, but leaves the specific events blank so you can create a local calendar more appropriate to the region of your survey. The Badghis survey workers tended to accept at face value the mother's reported age or month of birth. They needed substantial encouragement to probe more deeply for the child's month and year of birth in order to calculate a more accurate age. For this reason, our height-for-age estimates, as shown in the survey report, are probably not very good. We hope you can do better.

An important part of training in anthropometric techniques is the standardization exercise, in which all survey teams weight and measure the same children to estimate interobserver variability. The form we used in the Badghis training is contained in the file ANTHROPOMETRY STANDARDIZATION FORM.RTF. Such forms are also available from other sources.

Training also included 1) extensive discussion of specific job duties for each category of survey team worker, 2) detailed instructions for the second sampling stage, and 3) common questions and answers. These topics are covered in some detail in the document DUTIES & PROCEDURES.RTF. Training also included practice using the random number tables (RANDOM NUMBER TABLES.RTF).

Field work

The supplies and equipment we used in the Badghis survey are listed in the file SUPPLIES & EQUIPMENT LIST.RTF. These supplies were, of course, split up among the teams. Each team requires only one or a few items of some equipment, such as scales, height boards, and copies of instructions. Therefore, if you have fewer or more teams that the five we had, you may need fewer or more of some items. The overall requirement for other items, such as data collection forms, depends on the sample size.

We found that mothers were much for familiar with the Afghan calendar than the Gregorian calendar and that survey workers were more comfortable and could be more accurate if they recorded the Afghan dates. The data analysis program (NUTR.PGM) takes this into account when calculating ages and other time periods.

After completion of the second stage of sampling at a selected village, the survey workers listed selected households on the cluster control form, contained in the files CLUSTER CONTROL FORM (ENG).RTF and CLUSTER CONTROL FORM (DARI).RTF. They then completed each column as data collection in that cluster progressed. This form provides an important record of how successful each team was in locating and completing data collection at each household in the cluster and should be submitted with the data collection forms. The form also provides the team with a list of selected households so that they need not carry the village leader's list of village during data collection.

The cause of each death during the recall period was determined by verbal autopsy. The questions used are contained in the files VERBAL AUTOPSY QUESTIONS (ENG).RTF and VERBAL AUTOPSY QUESTIONS (DARI).RTF. They are based on validated questions as recommended by WHO and should not be substantially altered. Of course, should a survey manager wish to explore other causes of death, questions can be added. But careful consideration should be given to where new questions should be placed in the list. The list of questions is hierarchical, that is, when the interviewer receives a positive response from the respondent to a specific question, questioning stops and the appropriate code for cause of death is recorded on the data collection forms. No questions occurring after this question are posed to this respondent. For example, if a mother said her child died with bloody diarrhea, questions about pneumonia and meningitis would not be asked. Survey managers who interpose a question must realize that if the mother responds yes to this new question, no questions after it will be asked and exploration of these causes of death will not occur for this specific death.

Data entry and checking

Data collection forms are contained in the files DATA COLLECTION FORM (ENG).RTF and DATA COLLECTION FORM (DARI).RTF. Please feel free to add questions, but keep in mind that the data entry programs in this package, including the EpiInfo CHECK files, may no longer work unless you modify them to include the new added fields.

If you wish to use the data collection forms as they are, then the files contained in the Zip file DATA FILES - EMPTY.ZIP should all be put into the same folder. These files include all the EpiInfo files necessary to enter survey data collected on the data collection forms provided in this package. Set EpiInfo's default path for data files to this folder by using the EpiInfo main menu choice "Setup" and choosing "Path for data files." You will then be able to enter data with the CHECK files activated. They will help decrease errors during data entry. Also, using the data entry files contained in this package allows the data from each household to be entered into four separate data files. Linking variables will automatically be created so that these files can be related during data analysis. The four data files are:

HH.REC – Containing the data on general household factors from the top half of the page 1 of the data collection form

HHMEMBER.REC – Containing the household census on the bottom half of the page 1 of the data collection form.

WOMEN.REC – Containing the data on women of reproductive age from the page 2 of the DATA collection form.

CHILD.REC – Containing the data on children < 5 years of age from the page 3 of the data collection form.

You can also enter data into these files separately without using the automatic linking created during data entry. If you do this, please pay careful attention to correctly entering data into the variables needed for linking the data files during analysis. These variables are called:

CL – Cluster number
HH – Household number
MEMNUM – The number for each individual in the household
MOTHERS – The MEMNUM for each child's mother

These variables are then used to calculate unique identification number for each cluster (a variable called CLUSTER), household (CLHH), and individual (CLHHMEM).

These data files may contain some fields, such as child's hemoglobin, child's MUAC, and mother's hemoglobin, which were not used during the Badghis survey; they are included in the data files for the use of others who may wish to collect these data in subsequent surveys.

Data analysis

The file NUTR.PGM will produce the results necessary to complete a report similar to the report of the Badghis survey. Please carefully read the notes at the top of NUTR.PGM. To use these files, just put the NUTR.PGM file along with all the other data files (.REC, .CHK,.DAT, .IX, and .IXT files) in the folder which is the default EpiInfo path, as mentioned above. Then type "run nutr.pgm" from the command line in the EpiInfo Analysis program. The output of analysis will be contained in a file called NUTR.ANA If you used the original data entry files, NUTR.PGM will relate the four data files files (HH.REC, HHMEMBER.REC, WOMEN.REC, and CHILD.REC) appropriately during data analysis to combine data from all four data files. The file ZSCORE.RPT, contained in the file DATA FILES - EMPTY.ZIP, must also be placed in the default folder in order to produce the distributions of zscores necessary to produce figures similar to those in the Badghis report.

The file VARIABLE NAMES IN DATA COLL FORM.RTF is a copy of the data collection form to which the variable names for all the variables in the datafiles (HH.REC, HHMEMBER.REC, WOMEN.REC, and CHILD.REC) have been added in red font in squiggly brackets, for example {age}, {sex}, etc. The variable names are placed in or adjacent to the space on the data collection form where these data were recorded on the paper data collection forms in the field.

You can use the Excel spreadsheet DEATH RATE CALCULATION.XLS to calculate death rates from the results contained in the EpiInfo output (NUTR.ANA). The output necessary to do this is found in the section of NUTR.ANA called " Numerators & denominators for mortality rates." The spreadsheet identified which variables from NUTR.ANA to use. Just fill in the required data, shown in blue font in the spreadsheet, and it will calculate the rates and 95% confidence intervals for you.

The spreadsheet BREASTFEEDING ANALYSIS.XLS can be used to calculate the 3-month moving average percents of children eating solid food and children still breastfeeding. The data necessary to complete the spreadsheet are found in NUTR.ANA under the heading " Other breastfeeding analyses." The numbers can be cut and pasted into the spreadsheet and then into the Power Point file to create the graphs as seen in the file BADGHIS REPORT.PPT. With these graphs, you can determine the median age of introduction of solid food and cessation of breastfeeding.

Of course, the EpiInfo Analysis program does not generate hypothesis tests (that is, p-values and confidence intervals) which account for the cluster sampling. **As a result, the p-values and confidence intervals in the output from NUTR.PGM (the file NUTR.ANA) should be ignored!** The NUTR.PGM program does, however, create a new data file, called CHILDCL.REC which can be used in the EpiInfo Csample program to generate the correct confidence intervals and p-values shown in the Badghis report. NUTR.ANA also produces a new data called MORTCL.REC which can be used in the EpiInfo CSample program to calculate the design effect for mortality rates. These design effects will be necessary when using the spreadsheet DEATH RATE CALCULATION.XLS to calculate death rates and confidence intervals around death rates. In MORTCL.REC, a single variable (agesexgrp) identifies both age group and sex. This facilitates the use of MORTCL.REC in Csample.

The clusters in Badghis were chosen from a list of villages. This list started with villages in one district, then the villages in another district were listed, then the next district, and so on. This essentially produced a stratified sample because we guaranteed that the number of clusters in each district would be roughly proportional to the share of the province's population contained in that district. The data can be analyzed taking into account this equally-probability stratified sample. Unlike many stratified samples, no statistical weighting needs to be done because the sampling fraction in each stratum (district) is the same. The big advantage to such an analysis is that the precision often increases if the analysis accounts for this stratification. This is not difficult; when analyzing data in Csample, in the box called "Strata," choose the variable "DISTRICT." For some variables, the increase in precision will be well worth the very small trouble.

> Because of the hassle in using Csample, the Badghis report does not contain much hypothesis testing. It is confined to confidence intervals around the estimates of the prevalence of child malnutrition, the risk ratios for risk factors for child malnutrition, and confidence intervals around the mortality rates.

The NUTR.PGM program also produces some analyses which are not contained in the Badghis report. Moreover, it does not produce all possible analyses of the data; others are welcome to add to NUTR.PGM or suggest additional analyses to be added to it.

Writing the report

The results of analysis can be presented in many different ways. The Badghis report (BADGHIS REPORT.RPT) provides only one example. However, the presentation of the anthropometric results should include the prevalence of overall global acute malnutrition as well as the prevalence of moderate and severe acute malnutrition. The definitions given in the Methods section of the Badghis report should be used to define child and adult malnutrition. This is necessary to compare the results of different surveys.

Any report of the results of a survey should include a description of the methods used so that readers could, if wished, duplicate the survey. This also allows readers to judge the appropriateness of the methods for sampling, data collection, and data analysis. I also allows others to use the same methods so that surveys can be compared.

We recommend using something like the figures which display the distribution of z-scores. Such a display allows survey managers and readers to determine if there is a small subpopulation which is disproportionately malnourished and therefore makes up a large percentage of the malnourished children or, alternately, if all children are relatively malnourished and only those who started a bit thin now fall below the cut-off points defining malnutrition.

Distributing the results

Of course, the results of any survey should be distributed as widely as possible. As mentioned above, one objective of this survey package is to standardize nutrition assessment in Afghanistan. Your results could save someone else the trouble of conducting a survey if they are widely distributed and conform to the consensus recommendations of the Kabul meeting.

A final word

Thank you for looking over this survey package. We hope it helps you carry out health and nutrition assessment in whatever geographic area you are working in. And we hope that your revisions will make it more useful and easier to use. I understand that this may look complicated at first glance, but it really is not. If you need any help with planning and implementing your survey or analyzing the results, please feel free to contact one of the people listed below:

Felicite Tchibindat
Nutrition Project Officer, UNICEF – Afghanistan Country Office
Islamabad mobile phone: (92) 300 856 8120
E-mail: ftchibindat@unicef.org

Bradley A. Woodruff (Woody)
Medical Epidemiologist, U.S. Centers for Disease Control & Prevention
Office in Atlanta, Georgia, USA: 1 (770) 488-3523
E-mail: BWoodruff
@cdc.gov

Annex 8. SMART Workshop Participant List

Caroline Abla
Senior Health Advisor
International Medical Corps (IMC)
21 Second Street, NE, 2nd floor
Washington DC 20002 U.S.A.
Telephone: (202) 548-0835
Fax: (202) 548-0904
Email: cabla@imcworldwide.org

Pablo Aguilar
Consultant, Disaster Relief Program
Pan-American Health Organization (PAHO)
525 23rd St., NW
Washington DC 20037 U.S.A.
Telephone: (202) 974-3995
Fax: (202) 775-4578
Email: aguilapa@paho.org

Mario Joao de Almeida
Monitoring & Evaluation Coordinator
Africare Mozambique
Av. Josina Machel, 909
C.P. 435 Chimoio, Mozambique
Telephone: 258-51-23615/6
Fax: 258-51-23617
Email: chimoio@teledata.mz

David S. Ameyaw
Associate Director for Program Monitoring and Evaluation
Adventist Development and Relief Agency (ADRA)
12501 Old Columbia Pike
Silver Spring, MD 20904-6600 U.S.A.
Telephone: (301) 680-6337
Fax: (301) 680-6370
Email: David.Ameyaw@adra.org

Jock M. Baker
Senior Adviser - Assessment, Design, Monitoring & Evaluation
Emergency & Humanitarian Assistance Unit
CARE USA
151 Ellis St., NE
Atlanta, GA 30303
Telephone: (404) 979-9399
Fax: (404) 577-4840
Email: jbaker@care.org

Abdul Bari
Programme Officer
World Food Programme (WFP)
Wazir Akbar Khan Meena
Opposite French Embassy
Kabul City, Afghanistan
Telephone: 0046 73004 4000 or
00873 763 044 995 or 00882 1621 110 189
Fax: 0046 73004 4001 or
00873 763 044 996
Email: Kabul.abdul.bari@wfp.org and
Abdul.Bari@wfp.org

Rita Bhatia
Senior Programme Advisor
Strategy and Policy Division
World Food Programme (WFP)
Via Cesare Giulio Viola, 68/70
Parco de' Medici
00148 Rome Italy
Telephone: + 39 06 6513 2716
Fax: + 39 06 6513 2873
Email: Rita.Bhatia@wfp.org

Andrea Brezovsek
Technical Advisor
Medecins du Monde
62 Rue Marcadet
75018 Paris France
Telephone: 00 33 1 44 92 13 48
Fax: 00 33 1 44 92 99 92
Email:
andrea.brezovsek@medecinsdumonde.net

Frederick M. Burkle, Jr., MD, MPH
Deputy Assistant Administrator
Bureau for Global Health
USAID/GH
1300 Pennsylvania Ave, NW
Ronald Reagan Building, Rm. 3.06.004
Washington DC 20523-3600 U.S.A.
Telephone: (202) 712-4245
Fax: (202) 216-3485
Email: sburkle@usaid.gov

Dolline Busolo
Regional Nutritionist
HelpAge International
ARDC PO Box 14888
Westlands, Nairobi Kenya
Telephone: +254 2 444289 or 446991 or 449407
Email: helpage@africaonline.co.ke

Pierre Capitaine
International Medical Corps (IMC)
Afghanistan
C/o IMC
11500 W. Olympic Blvd.
Los Angeles, CA 90064 U.S.A.
Email: Pcapitaine@imcworldwide.org

Eunyong Chung
Nutrition Advisor
USAID/GH
1300 Pennsylvania Ave, NW
RRB 3rd Floor
Washington, DC 20523-3700 U.S.A.
Telephone: (202) 712-4786
Fax: (202) 216-3702
Email: echung@usaid.gov

Bruce Cogill
Director
Food and Nutrition Technical Assistance (FANTA) Project
Academy for Educational Development (AED)
1875 Connecticut Ave., NW
Washington, DC 20009-5721 U.S.A.
Telephone: (202) 884-8000
Email: bcogill@aed.org

Bienvenu Djossa
Regional Programme Adviser
Central Africa Bureau
World Food Programme (WFP)
BP 7308
Yaounde, Cameroon
Telephone: (+237) 222 85 82
or (+237) 223 72 37
Fax: (+237) 223 59 07 or (+237) 223 14 75
Email: Bienvenu.Djossa@wfp.org

Beth Dunford
Food for Peace Officer
USAID/DCHA/FFP
1300 Pennsylvania Ave., NW
Ronald Reagan Building
Washington, DC 20523 U.S.A.
Telephone: (202) 712-0658
Fax: (202) 216-3039
Email: bdunford@usaid.gov

Jonathan Dworken
Director for Humanitarian Assistance and Disaster Response
National Security Council
The White House
1600 Pennsylvania Ave., NW
Washington, DC 20504 U.S.A.
Telephone: (202) 456-9141
Fax: (202) 456-9140
Email: jdworken@nsc.eop.gov

Nancy Egbert
Emergency Public Health Consultant
USAID/OFDA
1300 Pennsylvania Ave., NW
Ronald Reagan Building, Rm. 8.7.84
Washington, DC 20523-3700 U.S.A.
Telephone: (202) 712-5052
Fax: (202) 216-3706
Email: negbert@usaid.gov

Anne-Sophie Fournier
Technical Director
Action Contre le Faim USA
875 Avenue of the Americas, Suite 1905
New York, NY 10001 U.S.A.
Telephone: (212) 967-7800
Fax: (212) 967-5480
Email: asf117@hotmail.com

Grey Frandsen
Project Officer
Center for Humanitarian and Disaster
Assistance Medicine (CDHAM)
1500 Massachusetts Ave., NW, #610
Washington, DC 20005 U.S.A.
Telephone: (202) 431-3983
Fax: (202) 659-3899
Email: grey@picnet.net

Professor Michael Golden
FANTA Consultant
Pollgorm, Ardbane, Downings, Letterkenny,
Co Donegal, Ireland
Telephone: +353- 74 – 55 164
Email: mikegolden@eircom.net

Bill Gray
Emergencies Manager
HelpAge International
PO Box 32832
London N1 9UZ
United Kingdom
Telephone: +44 207 278 7778
Email: bgray@helpage.org

Dr. Yvonne Grellety
FANTA Consultant
Pollgorm, Ardbane, Downings, Letterkenny,
Co Donegal, Ireland
Telephone: +353- 74 – 55 164
Email: ygrellety@hotmail.com

Professor Debarati Guha-Sapir
World Health Organization (WHO)
Collaborating Centre on Research and
Epidemiology of Disasters (CRED)
University of Louvain
3049 Clos Chapelle aux Champs
1200 Brussels, Belgium
Telephone: 32 2 764 3327
Fax: 32 2 764 3441
Email: sapir@epid.ucl.ac.be

Ananta Hans
Bureau for Population, Refugees and
Migration (PRM)
U.S. Department of State
2401 E St., NW, Suite L505
SA-1
Washington, DC 20522 U.S.A.
Telephone: (202) 663-1657
Email: a.hans@state.gov

Steve Hansch
Chair, Board of Advisors
Relief International and Partners for
Development
1915 Calvert St., NW, #402
Washington, DC 20009 USA
Telephone: (202) 667-7745
Fax: (202) 667-7746
Email: shansch@bellatlantic.net

Jeff Henigson
Assistant Project Officer
UNICEF
H276 3 UN Plaza
New York, NY 10017
Telephone: (212) 326-7460
Email: jhenigson@unicef.org

James F. Jackson
Project Manager
Food Security for War Displaced in
Khartoum State (FSWD) Project
CARE Sudan
C/O CARE
151 Ellis St., NE
Atlanta GA 30303 U.S.A.
Telephone: 249-114-77201
Mobile Telephone: 249-123-09465
Fax: 249-114-71106
Email: jfjackson2002@yahoo.com or
Jackson@sudan.care.org

Anne Joseph
Expert
European Commission
Commission Européenne
Bureau J-54 08/73 B
1049 Bruxelles, Belgium
Telephone: 00 32 2 298 48 03
Fax: 00 32 2 299 30 73
Email: anne.joseph@cec.eu.int

Sultana Khanum
Medical Officer
World Health Organization (WHO)
Department of Nutrition for Health and
Development
20 Av. Appia CH-1211
Geneva 27 Switzerland
Telephone: +41 22 791 2624
Fax: +41 22 791 4156
Email: khanums@who.int

Dennis King
Deputy Chief
Humanitarian Information Unit
U.S. Department of State
301 4th Street, SW
Room 602
Washington, DC 20547 U.S.A.
Telephone: (202) 205-4878
Email: KingD@pd.state.gov

Dr. Nancy Kingsbury
Science Advisor
Humanitarian Information Unit
U.S. Department of State
301 4th Street SW, Suite 602
Washington, DC 20547 U.S.A.
Telephone: (202) 205-5262
Email: nkingsbury@pd.state.gov

Luc Laviolette
Deputy Director
Programs Program Against Hunger,
Malnutrition and Disease (PAHMD)
Multilateral Programs Branch
Canadian International Development Agency
(CIDA)
200, Promenade du Portage
Gatineau, Quebec K1A 0G4 Canada
Telephone: (819) 994-3958
Fax: (819) 953-5348
Email: luc_laviolette@acdi-cida.gc.ca

Karen LeBan
Executive Director
The Child Survival Collaborations and
Resources (CORE) Group
220 I Street NE Suite 270
Washington, DC 20002 U.S.A.
Telephone: (202) 608-1830
Email: kleban@worldvision.org

Brian Luck
Emergency Coordinator
Programs Program Against Hunger,
Malnutrition and Disease (PAHMD)
Canadian International Development Agency
(ACDI/CIDA)
200 Promenade du Portage
Hull, Québec K1A 0G4 Canada
Telephone: (819) 997-1646
Fax: (819) 953-5348
Email: bryan_luck@acdi-cida.gc.ca

Mary S. Lung'aho
Senior Technical Advisor for Emergency Health and Nutrition
LINKAGES Project
Academy for Educational Development (AED)
114 Ridgewood Rd.
Glastonbury, CT 06033-3639 U.S.A.
Telephone: (860) 633-3437
Fax: (860) 659-4277
Email: mlungaho@aol.com

Paula Lynch
Deputy Director, Policy and Resource Planning
Bureau for Population, Refugees and Migration (PRM)
U.S. Department of State
2401 E St., NW, Suite L505, SA-1
PRM/PRP
Washington, DC 20522 U.S.A.
Telephone: (202) 663-1076
Fax: (202) 663-3094
Email: p.lynch@state.gov

Barbara Macdonald
Senior Nutrition Advisor
Canadian International Development Agency (CIDA)
200 Promenade du Portage
Hull, Quebec K1A 0G4 Canada
Telephone: (819) 994-3920
Fax: (819) 953-5348
Email: barb_macdonald@acdi-cida.gc.ca

Tom Marchione
Food Security and Nutrition Advisor
USAID/DCHA/PPM
1300 Pennsylvania Ave., NW
Ronald Reagan Building, Rm. 8.06D
Washington, DC 20523 U.S.A.
Telephone: (202) 712-1645
Fax: (202) 216-3385
Email: TMarchione@usaid.gov

Paolo Mattei
Evaluation Officer
World Food Programme (WFP)
c/o WFP OEDE - Office of Evaluation
Via Cesare Giulio Viola, 68/70
Parco de Medici
00148 Rome, Italy
Telephone: +39-06-65132981
Fax: +39-06-65132833
Email: paolo.mattei@wfp.org

Andrew Mayne
Chief, Population and Geographic Data Section
United Nations High Commissioner for Refugees (UNHCR)
Case Postale 2500, CH-1211
Geneve 2 Depot Switzerland
Telephone: 41 22 739 8838
Fax: 41 22 739 7328
Email: mayne@unhcr.ch

Constance M. McCorkle
Monitoring & Evaluation Expert
Catholic Relief Services (CRS)
7767 Trevino Lane
Falls Church, VA 22043 U.S.A.
Telephone: (703) 204-1837
Fax: (703) 204-1296
Email: mccorkle@boo.net

Zlatan Milisic
Programme Adviser (Emergency)
World Food Programme (WFP)
Via Cesare Giulio Viola 68-70,
Parco de Medici
00148 Rome Italy
Telephone: + 39 06 6513 2812
Fax: + 39 06 6513 2795
Email: zlatan.milisic@wfp.org

Nancy Mock, Dr.P.H.
Associate Professor
Tulane University
Department of International Health
1440 Canal Street, Suite 2200
New Orleans, LA 70112 U.S.A.
Telephone: (504) 587-7318
Fax: (504) 584-3653
Email: mock@tulane.edu

Peter Morris
Team Leader, Technical Assistance Group
USAID/DCHA/OFDA
Ronald Reagan Building, Rm. 8.6.43
1300 Pennsylvania Ave., NW
Washington, DC 20523 U.S.A.
Telephone: (202) 712-1095
Fax: (202) 216-3707
Email: pmorris@usaid.gov

Mugo Muita
Deputy Household Livelihood Security Coordinator
CARE USA
151 Ellis St., NE
Atlanta, GA 30303 U.S.A.
Telephone: (404) 797-9330
Fax: (404) 979-2625
Email: muita@care.org

Michelle Munro
Policy and Programme Advisor, HIV/AIDS and Health
CARE Canada
Po Box 9000
Ottawa ON K1G 4X6
Canada
Telephone: (613) 228 5694
Fax: (613) 226 5777
Email: michellem@care.ca

Altaf Musani
Technical Officer for Emergency and Humanitarian Action
World Health Organization (WHO)
Eastern Mediterranean Regional Office
P.O. Box 7608
Abdul Razzak Al Sanhouri Street, Nasr City
Cairo 11371 Egypt
Telephone: +20123900537
Fax: +2022765428
Email: musania@emro.who.int

Carolyn Mutamba
Team Leader, Planning, Monitoring, Reporting and Evaluation Unit
USAID/DCHA/FFP/EP
1300 Pennsylvania Ave.
Ronald Reagan Building, Rm. 7.06-141
Washington, DC 20523-7600 U.S.A.
Telephone: (202) 712-0757
Fax: (202) 216-3042
Email: cmutamba@usaid.gov

Mark Myatt
Consultant Epidemiologist and Senior Research Fellow
The Institute of Ophthalmology
Unit B, Station Building,
Llanidloes, Powys
SY18 6EB, Wales
United Kingdom
Telephone: +44 (0) 1686 411 005
Fax: +44 (0) 1686 411 005
Email: mark@myatt.demon.co.uk

Christine Nadori
Medical Program Officer
Doctors Without Borders USA (MSF)
6 East 39th Street, 8th Floor
New York, NY 10029 U.S.A.
Telephone: (212) 655-3793
Fax: (212) 679-7016
Email: Christine_Nadori@newyork.msf.org

Carlos Navarro-Colorado
Research Officer
Action Contre la Faim
4, Rue Niepce
Paris 75014 France
Telephone: +34133568607
Fax: +34133568800
Email: navarro_colorado@hotmail.com

Eric K. Noji
Special Assistant to the U.S. Surgeon General for National Security
U.S. Public Health Service
200 Independence Ave.
Washington DC 20201 U.S.A.
Telephone: (202) 690-5707
Fax: (202) 690-6985
Email: enoji@cdc.gov

Karen Nurick
Health Program Officer
USAID/DCHA/PPM
1300 Pennsylvania Ave., NW
Ronald Reagan Building, Rm. 8.6, 101
Washington, DC 20523 U.S.A.
Telephone: (202) 712-5024
Fax: (202) 216-3385
Email: knurick@usaid.gov

Charles Ebow Owubah
Monitoring and Evaluation Officer
World Vision U.S.
220 I St., NE, Suite 270
Washington, DC 20002 U.S.A.
Telephone: (202) 608-1886
Fax: (202) 547-4834
Email: cowubah@worldvision.org

Eric Picard
Donor Coordination Advisor
Bureau for Asian and the Near East
USAID
1300 Pennsylvania Ave., NW
Ronald Reagan Building, Rm. 4.9-143
Washington, DC 20523 U.S.A.
Telephone: (202) 712-4016
Fax: (202) 216-3379
Email: epicard@usaid.gov

Noreen Prendiville
Project Manager / CTA FAO Somalia
Food and Agriculture Organization (FAO)
P.O. Box 1230
Village Market, Nairobi, Kenya
Email: noreen.prendiville@fsau.or.ke

Dr. Claudine Prudhon
Refugee Nutrition Information System (RNIS) Coordinator
UN System Standing Committee on Nutrition
ACC/SCN c/o WHO
20 Avenue Appia CH 1211
Geneva 27 Switzerland
Telephone: + 41 22 791 04 56 or
+ 41 22 791 3481
Fax: + 41 22 798 88 91
Email: accscn@who.int or
clprudhon@yahoo.fr

Carol Puzone
Senior Associate, Monitoring & Evaluation
American Red Cross
431 18th Street, NW, 2nd Floor Washington, DC 20006-5304 U.S.A.
Telephone: (202) 639-3475
Fax: (202) 639-3570
Email: puzonec@usa.redcross.org

Anne Ralte
Humanitarian Assistance Advisor Bureau for Policy & Program Coordination (PPC)
USAID
1300 Pennsylvania Ave., NW
Ronald Reagan Building, Rm. 6.7-103
Washington, DC 20523 U.S.A.
Telephone: (202) 712-4454
Fax: (202) 216-3124
Email: aralte@usaid.gov

Bill Renison
Program Manager
USAID/PPC
Ronald Regan Building
1300 Pennsylvania Ave NW
Washington, DC 20523 U.S.A.
Telephone: (202) 712-0986
Email: brenison@usaid.gov

Juanita Rilling
Team Leader, Enhanced Planning Team
USAID/OFDA
1300 Pennsylvania Ave., NW
Ronald Reagan Building
Washington, DC 20523-8602 U.S.A.
Telephone: (202) 712-5051
Fax: (202) 216-3707
Email: jrilling@usaid.gov

Les Roberts
Director of Health Policy
International Rescue Committee (IRC)
122 East 42nd St.
New York, NY 10168-1289 U.S.A.
Telephone: (607) 863-4675
Email: les@theirc.org

Catherine Robins
Senior Associate, Monitoring & Evaluation
American Red Cross (ARC)
431 18th St., NW, 2nd Floor
Washington, DC 20006 U.S.A.
Telephone: (202) 639-3459
Fax: (202) 639-3570
Email: robinsc@usa.redcross.org

Court Robinson
Research Associate
Bloomberg School of Public Health
Johns Hopkins University
615 N. Wolfe St., Suite E8132
Baltimore, MD 21205 U.S.A.
Telephone: (410) 955-3892
Fax: (410) 614-1419
Email: crobins@earthlink.net

Mara Russell
Coordinator
Food Aid Management (FAM)
1625 K St., NW, Suite 501
Washington, DC 20006 U.S.A.
Telephone: (202) 595-2801
Fax: (202) 223-4862
Email: mrussell@foodaidmanagement.org

Lynn Sauls
Management Specialist
USAID/ANE/SPOTS
1300 Pennsylvania Ave., NW
Ronald Reagan Building
Washington, DC 20523 U.S.A.
Telephone: (202) 712-0543
Email: lsauls@usaid.gov

Rebecca Scheurer
Operations Specialist
USAID/OFDA
1300 Pennsylvania Ave., NW
Ronald Reagan Building
Washington, DC 20523 U.S.A.
Telephone: (202) 712-5815
Fax: (202) 216-3706
Email: rscheurer@usaid.gov

Trisha Schmirler
Technical Information Specialist
Food Aid Management (FAM)
1625 K St., NW, Suite 501
Washington, DC 20006 U.S.A.
Telephone: (202) 595-2803
Fax: (202) 223-4862
Email: tschmirler@foodaidmanagement.org

Eric Schwartz
Senior Fellow
United States Institute of Peace
1200 17th Street, NW
Washington DC 20036 U.S.A.
Telephone: (202) 429-3834

John Seaman
Save the Children UK
Mary Datchelor House
17 Grove Ln.
London SE5 8RD
United Kingdom
Telephone: +44-20-7703-5400
Fax: +44-20-7793-7610
Email: u.berghaus@scfuk.org.uk

Paulina Semedo
Coordinator of National Nutrition Programme
Ministry of Health – Angola
Rua Major Kanhangulo
P.O. Box 2707
Luanda, Angola
Telephone: +244 91 506323
Email: paulina_semedo@hotmail.com

Ahmad Shah Shahi
Vulnerability Field Team Manager
World Food Programme (WFP)
Afghanistan
Kabul City
Wazir Akbar Khan Meena
Opposite French Embassy
Or
H#3, S#2, f8/3
Islamabad
Pakistan
Telephone: 0046 73004 4000 or
00873 763 044 995 or 00882 1621 110 189
or 2855860/5 Ext. 248 (Islamabad)
Fax: 92 51 285003 (Islamabad)
Email: kabul.afsu@wfp.org and
Ahmadshah.Shahi@wfp.org

Kendra Siekmans
Nutrition Program Manager
World Vision Canada
1 World Drive
Mississauga, ON L5T 2Y4 Canada
Telephone: (905) 565-6200, ext. 3866
Fax: (905)696-2164
Email: Kendra_siekmans@worldvision.ca

Luzitu Simao
Technical Officer
World Health Organization (WHO)
20 Avenue Appia CH 1211
Geneva 27 Switzerland
Telephone: 00 41 22 791 2720
Fax: 00 41 22 791 48 44
Email: simaol@who.int

John Simon
Deputy Assistant Administrator
Bureau for Policy & Program Coordination (PPC)
USAID
Ronald Reagan Building
1300 Pennsylvania Ave., NW
Washington, DC 20523 U.S.A.
Telephone: (202) 712-5820
Email: JSimon@usaid.gov

Nancy L. Sloan, Dr.P.H.
Epidemiologist
Population Council
1 Dag Hammarskjold Plaza
New York, NY 10017 U.S.A.
Telephone: (212) 339-0601
Fax: (212) 755-6052
Email: nsloan@popcouncil.org

Cressida Slote
Monitoring and Evaluation Program Manager
USAID/DCHA/OTI
1300 Pennyslvania Ave, NW,
Rm 2.09-036
Washington, DC 20523-8602 U.S.A.
Telephone: (202) 712-5417
Fax: (202) 216-3406
Email: cslote@usaid.gov

Dianne Spearmann
Director, Strategy and Policy Division
World Food Programme (WFP)
Via Cesare Giulio Viola, 68/70
Parco de' Medici
00148 Rome Italy
Telephone: +39 06 6513 2600
Fax: +39 06 6513 2873
Email: Dianne.Spearman@wfp.org

Paul Spiegel
Medical Epidemiologist
Center for Disease Control (CDC)
4770 Buford Highway, NE, Mailstop F-48
Atlanta, GA 30341 U.S.A.
Telephone: (770) 488-3136
Fax: (770) 488-7829
Email: Pspiegel@cdc.gov and spiegel@unhcr.ch

Helen Stiefel
FANTA Consultant
Center for Nutrition
Academy for Educational Development (AED)
1875 Connecticut Ave., NW
Washington, DC 20009 U.S.A.
Telephone: (202) 884-8328
Fax: (202) 884-8792
Email: hstiefel@aed.org

Caroline Tanner
Emergency Advisor
Food and Nutrition Technical Assistance (FANTA) Project
Academy for Educational Development (AED)
1875 Connecticut Ave., NW
Washington, DC 20009-5721 U.S.A.
Telephone: (202) 884-8000
Email: ctanner@aed.org

Anna Taylor
Save the Children UK
Mary Datchelor House
17 Grove Ln.
London SE5 8RD
United Kingdom
Telephone: +44-20-7703-5400
Fax: +44-20-7793-7610
Email: u.berghaus@scfuk.org.uk

Emma Thomas
Conference Assistant
Food Aid Management (FAM)
1625 K St., NW, Suite 501
Washington, DC 20006 U.S.A.
Telephone: (202) 595-2821
Fax: (202) 223-4862
Email: intern2@foodaidmanagement.org or eagletonthomas@hotmail.com

Marjatta Tolvanen
Project Officer, Nutrition in Emergencies
UNICEF
H752 3 UN Plaza
New York, NY 10017 U.S.A.
Telephone: (212) 824 6375
Fax: (212) 824 6465
Email: MTolvanen@unicef.org

Paola Valenti
Project Officer, Nutrition
UNICEF
Rua Major Kanhangulo
P.O. Box 2707
Luanda Angola
Telephone: +244 2 332348 or 331010
Fax: +244 2 337037
Email:
Paola_Valenti_po030a01@smtplink.unicef.org

Bernard Vicary
Monitoring and Evaluation Officer
World Vision U.S.
220 I St., NE, Suite 270
Washington, DC 20002 U.S.A.
Telephone: (202) 572-6368
Fax: (202) 572-6485
Email: bvicary@worldvision.org

Dick Wall
Consultant
2500 Q St., NW, #743
Washington, DC 20007 U.S.A.
Telephone: (202) 342-6138
Fax: (202) 342-0713
Email: dw5616@aol.com

Melissa Jo Ward
Emergency Food Aid Officer
USAID/DCHA/FFP
1300 Pennsylvania Ave, NW
Ronald Reagan Building
Washington, DC 20523
Telephone: (202) 712-0535
Fax: (202) 216-3042
Email: meward@usaid.gov

Nathalie de Watteville
Deputy Head of Delegation for North America
International Coordinating Committee of the Red Cross (ICRC)
1033 N. Fairfax St., Suite 400
Alexandria, VA 22314 U.S.A.
Telephone: (703) 519-9901
Fax: (703) 519-9930
Email: irc-va@irc-hq.com

Bill Weiss
Research Associate
Bloomberg School of Public Health
Johns Hopkins University
615 N. Wolfe Street, Rm E8132
Baltimore, MD 21205
Telephone: (410) 614-6172
Fax: (410) 614-1419
Email: bweiss@jhsph.edu

Alice Willard
Monitoring & Evaluation Manager
American Red Cross
431 18th St., NW, 2nd Floor
Washington DC 20006-5304 U.S.A.
Telephone: (202) 639-3405
Fax: (202) 639-3570
Email: Willarda@usa.redcross.org

Bradley Woodruff
Medical Epidemiologist
Center for Disease Control (CDC)
4770 Buford Highway, Mailstop F-48
Atlanta, GA 30341 U.S.A.
Telephone: (770) 488-3523
Fax: (770) 488-7829
Email: BWoodruff@cdc.gov

Dr. Guy Zimmermann
International Federation of the Red
Cross/Red Crescent (IFRC)
CP 372 1211
Geneva Switzerland
Telephone: +41.22.730.42.54
Fax: +41.22.733.03.95
Email: zimmerma@ifrc.org